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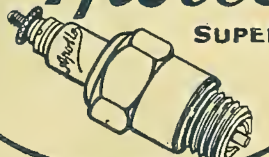

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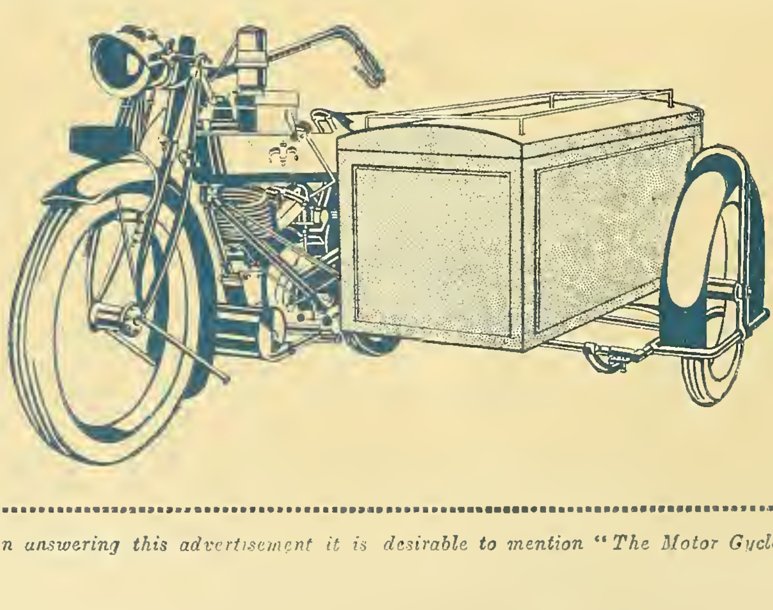

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The Central Council of Motoring Organisations.

THERE is no getting beyond the fact that for some time dissatisfaction with the working of existing motoring organisations has become more and more general, and in some quarters this dissatisfaction has received open expression. In a recent issue we made a few remarks on the work of the Auto Cycle Union, and recommended to motor cyclists the advisability of joining this institution at once. Needless to say, we had more in mind than we actually said, and the main point at the back of our minds was the formation of the new United Council, to be formed by committees or deputies from the existing automobile bodies.

The present restrictions all round us and the obviously crying need for some really capable body that will meet the necessities of *all* motorists have prompted many of the moving spirits of the industry to wonder if something could not be done towards preparing a way for better times after the war, and a scheme was suggested by "British Subject" in *The Autocar* of October 13th, which is now on the high road to fruition.

A Central Council is in the course of formation, and is to consist of representatives of all the established motoring bodies. Thus, the Council will automatically operate only in those matters that concern motorists as a whole, and as the commercial users of motors—who, when all is said and done, are by far the most important motorists of the country—are well represented on this body, it will have behind it the fillip of business enterprise as well as that of purely private requirements. The Council is not yet definitely established, as one of the leading organisations is at the present time holding back, and this is typical of the attitude that has characterised many of these bodies in the past. We think, however, that there is very little doubt that ultimately this body will fall into line, and that we shall at last have some organisation that represents every motorist in the country.

Up till now it has been very easy to criticise the inactivity of our various institutions, and it has also been very easy to overlook the cause of that inactivity, which is, that in most instances an agitation on the part of one of these bodies to ameliorate the lot of motorists in general would have been directly opposed to Government measures for the more efficient carrying on of the war. This being the case, most of our organisations have, and we think rightly, done very little or nothing. We do not for one moment suppose or pretend that the new Council will make any immediate difference to the lot of motorists, for obviously the first thing it could do in this direction would be to obtain some concessions on the fuel question, and any such concessions, we are officially informed, would react detrimentally to the Government in its prosecution of the war. We are sure that no intelligent motorist or member of any organisation would wish his motoring prospects to be brightened at the expense of those of the country as a whole.

When the war is over, however, the new Council will find plenty to do, and in our opinion it is important that it should be there to do it. The possibilities of heavy taxation and even, perhaps, the maintenance of some of the present restrictions after the war, are far from being remote fantasies, and we think that no one will deny that one Central Committee or Organisation will be able to put up a much better fight against persecution than will a number of comparatively small independent bodies.

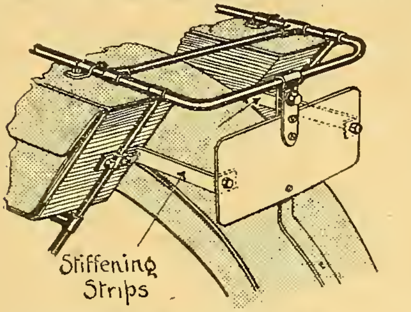
By joining any existing organisation a motorist will be directly helping this United Council in the stupendous task that lies before it; and we cannot do better than to appeal once more to our readers to consider, and we hope, favourably, the question of joining the official motor cyclists' body, the A.C.U.

An index to the advertisements in this issue will be found on the page facing the back cover.

IDEAS: Useful and Ingenious.

STIFFENING REAR NUMBER PLATES.

It is quite a simple performance to provide two stiffeners for the rear number-plate, which will prevent the plate from rattling and breaking off, especially if the rear light is fixed to it. Two pieces of hoop iron and two small bolts are the only articles required.

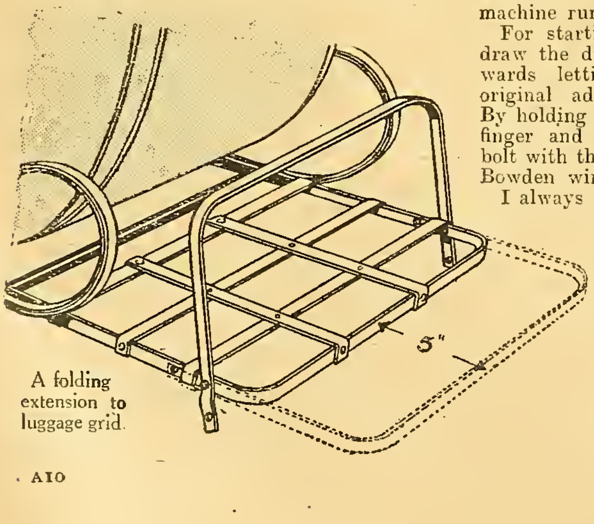


Stiffening strips for number plate to prevent rattle.

First drill holes at the ends of each piece of hoop iron, then bend the ends of each at right angles to each other, and give two coats of black enamel. Holes should then be drilled through the number-plate, and the bolts in the rear end of the toolbags removed, when the stiffeners can be inserted and bolted up, giving firm and stiff supports to the plate.—H. Slater, Doncaster.

EXTENSION TO LUGGAGE GRID.

Owing to the rear springs of sidecar being close to the edge of the grid, the space on the grid in front of springs is not very accommodating for a touring portmanteau. Take off the present grid and drill two holes in each side for ¼in. bolts, procure a piece of ⅜ x ¼in. iron, bend it, and drill for bolts, then obtain four ¼in. bolts with spring washers. Give two coats of black enamel before fixing. When not in use, one bolt from each side can be taken out and the extension folded back out of the way.—H. Slater, Doncaster.

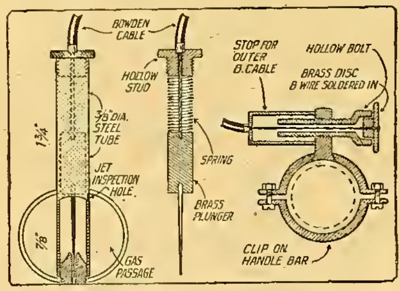


A folding extension to luggage grid.

A VARIABLE JET CARBURETTER.

The sketch I send of the alterations and additions to my Scott carburetter is self-explanatory. Anyone with a few tools can make this device, which has enabled me to obtain 75 to 80 m.p.g. solo and 50-60 m.p.g. with sidecar.

To adjust the jet, set the throttle about one-third open, and air slightly more. Then screw down the needle by turning the cup bolt until the machine misfires. Afterwards gently unscrew until the machine runs at the speed desired.



Fitments for making the standard jet of a Scott carburetter variable.

For starting purposes or hill-climbing, draw the disc back to enlarge jet, afterwards letting go the disc when the original adjustments will be obtained. By holding the disc with the ball of forefinger and thumb and turning the cup bolt with the tips of finger and thumb the Bowden wire is prevented from turning.

I always drive at a fair speed and take advantage of long down grades to save petrol, or substitute, or whatever I have in the tank.

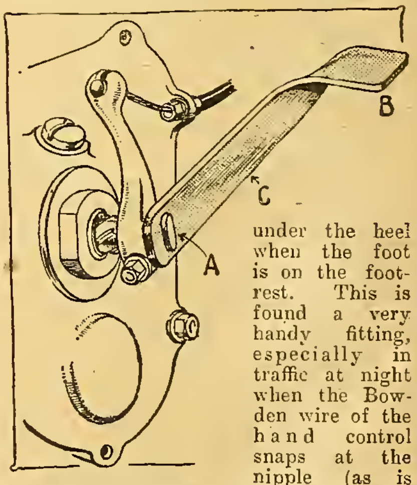
The whole affair was made from the scrap box, except the cup bolt, which is an ordinary Bowden adjusting bolt, and it is well worth the comparatively slight trouble of making.—X 3245, Blythe.

REPAIRING A BURST TUBE

The following wrinkle has been sent to us by a correspondent. In repairing a large burst in a tube it is a good plan to put a patch on *both inside and out.* If the damage to the air tube is a cut or burst large enough to put a finger through it is possible to patch it inside. Take some solution on the finger tip and smear it round the edges of the hole inside; prop the hole open with a piece of card or a splinter of wood, solution a patch, and let both dry. Some little management is necessary to get the patch inside without sticking it in the wrong place, but it can be done by laying the tube across a flat board with the wound uppermost. Get the patch opened out flat against the back of the tube opposite the gash, and press the edges of the hole firmly down upon it. If there is time it is well to leave it for some hours. Then solution a much larger patch on the outside in the ordinary way, only in applying the patch begin at one side and *roll* it over the injured spot.—Ailette.

SIMPLE FOOT CLUTCH CONTROL.

The following simply made foot clutch control for Sturmey-Archer gear has been received from France. A piece of flat thin iron bar, about 10in. long, is first bent at right angles so as to form the piece B. At the other end a hole is drilled and then filed so as to make a driving fit on the end of the worm A. The bar is heated and driven on to the worm, and when cool makes a good tight fit, and the foot control is then fixed. The length of the bar C can be made so as just to rest under the heel when the foot is on the foot-rest. This is found a very handy fitting, especially in traffic at night when the Bowden wire of the hand control snaps at the nipple (as is often the case).—T.M.C. and J.W.M., B.E.F.



A simple foot control for Sturmey-Archer countershaft gear.

OCCASIONAL COMMENTS

BY 'IXION'

Radial Engines for Road Motors.

W. G. ASTON voiced in a recent issue prophecies which have already appeared repeatedly in *The Motor Cycle* and its associated journals, to the effect that the radial engine must ultimately oust the transmogrified motor car engines which at present do duty on the bulk of aeroplanes, and that it further bids fair to rival the vertical types on road motors. How far radial engines, when perfected, will affect the design of motor cycles is a thorny question. They are quite obviously and unquestionably the goods for cycle cars: and if they are more expensive to make than these semi-radials, the V and flat twins, they should nevertheless crop up in increasing numbers on light three and four wheelers soon after the war is over. A three-cylinder radial, with cylinders disposed in the form of a Y, would be just as easily housed as a V in such a machine as the Morgan Runabout, and, while costing little more, would give infinitely better results all round; *a fortiori*, a five-cylinder radial would be better still, but the cost might be prohibitive in a sphere where prices rule keen.

The Radial-engined Motor Bicycle.

STUDYING the same question as it applies to solo mounts, we are up against a second problem besides cost—that of housing the engine. The principle of a radial engine is already accepted, for the V and flat twins are nothing more or less than radials of an inferior and incomplete type. Their existing success proved that cooling a screened cylinder was not impracticable, even before the war, when air-cooling was still in its crude stage: and, as far as this point goes, they show that we can mount a Y or five-cylinder radial longitudinally in the frame. When war broke out, a battle between two types of radial was waging, and was undecided. The V two-cylinder radial was fighting the flat two-cylinder radial, and the battle was drawn for the moment—the flat twin had won on all points bar housing, and this difficulty seemed insuperable except in moderate sizes. The three and five-cylinder radials can easily be housed in tiny sizes. In larger sizes they will be very difficult to accommodate, and will hoist the centre of gravity and the transmission line rather too high. Unless they offer very distinct running advantages over the flat twin, we may see them experimented with for the higher horse-powers only. For example, we may see a five-cylinder, set athwart the frame, tilted backwards a little, and driving by a shaft; or we may see a three-cylinder, set in the plane of the frame, and driving by chain. But the problems are so awkward that the flat twin up to 500 c.c. and the V twin above that limit will quite probably hold their own. One thing is quite evident—the Henderson Co. has shown that under certain production conditions the multiplication of cylinders need not increase the cost of a bicycle, if other reasons render the change desirable.

A Place for the Dynamo Battery.

I AM so completely satisfied with the general merits of a first-class sidecar dynamo outfit, *e.g.*, the Lucas, that I am beginning to yearn for the day when lighting restrictions are ended, and the solo mount *de luxe* can enjoy the blessings of reliable electric light. As I have emphasised *ad nauseam*, the crux of the problem is the battery. There is hardly any freeboard on existing motor bicycles, and it puzzles the wit of man to find room for a sizeable battery. If you fit a small battery trouble sits hard on your trail; the best batteries will not stand eternal charging and discharging at a very high rate, and if you use a powerful head lamp in conjunction with a small battery, it would be exhausted in a very brief spin unless it were simultaneously charged up at a colossal rate. Compare the size and construction of the batteries which Lucas supply for the well under a sidecar seat with the batteries which figured in the few experimental solo sets—hardly any larger than a 5s. 6d. acetylene generator. The spring frame may solve the trouble eventually. No sane man would mount anything as fragile as a battery on a rigid frame carrier, for there road vibration is always doing its durnedest. But the carrier of a first-class spring frame, such as my own A.B.C. possesses, is a haven of peace. We may ultimately shift the toolbags, and dispose a pair of decent batteries one on either side of the carrier in panniers. The tools can go in a bag on the top frame tube, or in a drawer under the carrier grid. Anyhow, we've simply *got* to perfect the solo dynamo outfits somehow; there is no lighting to compare with what they are capable of doing.

A Piston Ring Tip.

IT may be news to some of our readers that an engine can often be cured of plug-sooting propensities by simply turning one or more of the piston rings the other way up. Suppose that a piston ring is only bearing on the cylinder wall with part of its surface. If that surface is along the upper edge of the ring, as shown in fig. 1, every down stroke of the piston wedges oil beneath the underside of the ring, and this oil is squeezed past the bearing surface, and reaches the combustion chamber. If the ring is now inverted (see fig. 2), the bearing part of the surface meets the oil first on the downstroke, and acts as a scraper. Consequently, reversing one or more of the rings may have a considerable influence on the cleanliness of the combustion chamber.

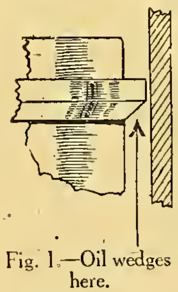


Fig. 1.—Oil wedges here.

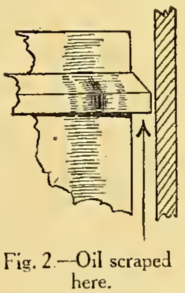
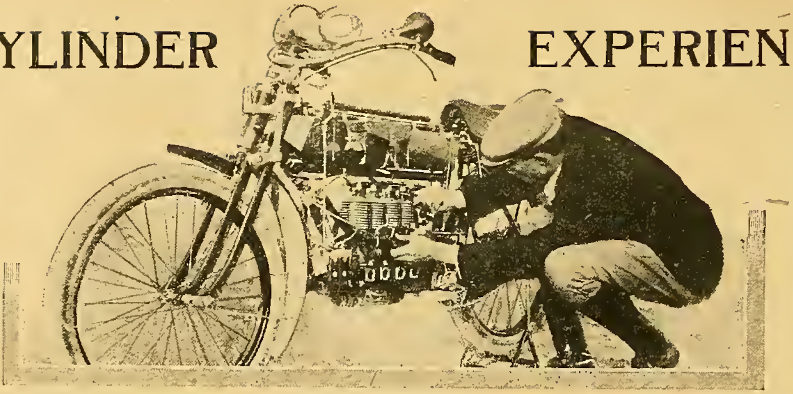


Fig. 2.—Oil scraped here.

FOUR-CYLINDER EXPERIENCE.



Some Useful Hints and Tips by an Old Rider & Admirer of the Four-cylinder F.N.

As there seems to be a renewal of interest in the four-cylinder engine for motor cycles, the following hints by a former F.N. owner may be found useful. These apply chiefly to the 1910 and 1911 models, but some hold good for other years. By way of preface, it should be remembered by those who fear the extra complication of four cylinders that there are many counterbalancing advantages, such as adequate bearing surface, increased cooling area, smooth and silent running, and the easy application of positive and enclosed transmission by shaft.

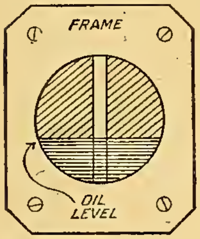


Fig. 1.—Oil level discs.

Starting with the engine. The automatic inlet valves should be inspected at fairly frequent intervals, say 800 to 1,000 miles, and checked for *equal* opening of ⅛in. and equal spring tension, about 12 oz. to open fully, and as the springs are quite cheap it is as well to renew them often. For smooth, powerful running it is most important to guard against air leaks, and to keep the compression good and equal in each cylinder. Although the automatic carburetter functions well a Bowden air inlet is useful, not only for mixture correction, but for running down hill against compression, with the throttle closed, to prevent oil from being drawn past the rings, and also for injecting paraffin after coming in from a run should the inlet valves be inclined to gum up. If one or more cylinders do not fire when starting, the cause is probably a stuck inlet valve, which can be carefully prised open with a screwdriver inserted through the plug orifice. In case of misfiring, to tell which cylinder is missing feel the exhaust pipes.

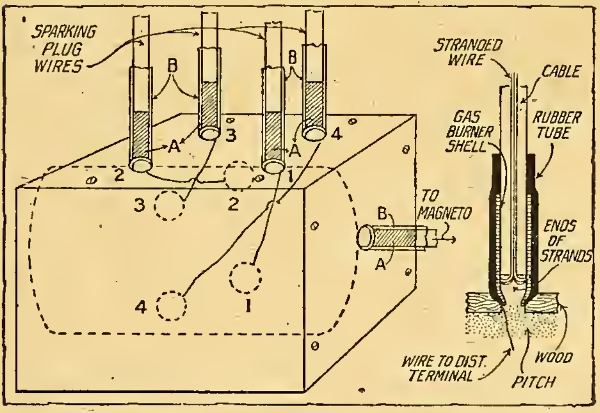


Fig. 2.—The rubber cover for distributer, and section of one of the insulated terminals.

The four oil level windows in the crank case soon get obscured, but this can be overcome by fitting slotted discs of tin behind them (see fig. 1). The level should be about ⅜in. up the glass. As the engine runs at a very high speed the spark plug electrodes need regular attention to keep the gaps equal, and the high-tension distributer should be wiped clean with a rag dipped in petrol. The distributer being in an exposed position the current is liable to short in wet weather, so it is advisable to fit a rubber cover, or, better, a permanent casing, as shown in fig. 2. Misfiring may be caused by one of the exhaust valve tappets touching the lifter bar, thus preventing the valve from seating. If this is so the Bowden wire stop should be slacked off a turn. Continued misfiring will loosen the level casing where it screws in owing to the "chattering" set up, besides causing loss of power and waste of petrol. A slight increase of power may be obtained by drilling four ¼in. holes in the central tube of the silencer—one opposite each exhaust pipe.

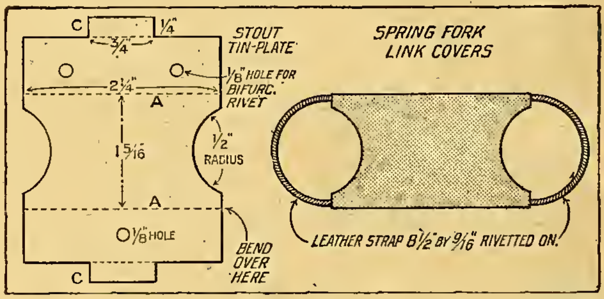


Fig. 3.—Spring fork link covers.

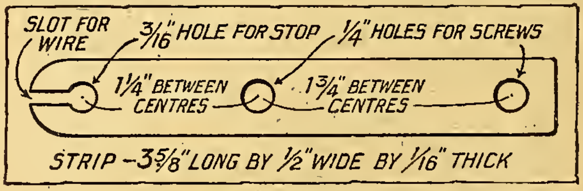


Fig. 4.—An arrangement whereby handle-bar control for the spark can be constructed.

The spring forks are comfortable, but the links soon wear and rattle. This can be obviated by thick leather washers under the upper link retaining bolts and grease packed covers for the lower links made from stout tin and leather strap. See fig. 3.

Four-cylinder Experiences.—

A magneto switch is a useful fitting. The wire from this should run to the screw on the bar which carries the contact breaker cover spring. If desired, handlebar control for the spark advance can be arranged by fitting a plate for the Bowden wire stop under the oil tank. See fig. 4 for measurements.

If pedalling gear is fitted this may as well be replaced by footboards fixed to the rests at the forward ends and supported at the rear by angle irons from a rod through the bracket shell, as shown in fig. 5.

In conclusion, the F.N. is a machine which well repays one for attention, and given this it will be found both fast and reliable, beating any single or twin for staying power. A trial run will convince anyone that the four-cylinder is the engine of the future on account of its power, smoothness, absence of vibration, remarkable acceleration, and ease of starting, to say nothing of the weather-proof transmission.

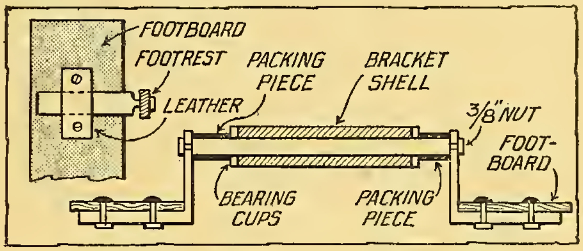


Fig. 5.—Section of footboards, which are fitted in place of pedals.

The National Motor Cyclists' Fuel Union.

The Body created to obtain Fuel Supplies for Motor Cyclist Munitioners.

SOME mention has already been made in these pages of the above institution, and a few facts concerning its work cannot fail to interest our readers. The Union was founded by a few of the principal men in the Engineering Department of an important Midland manufacturing firm, and its object is national in scope and patriotic in character, as it intends to provide for the indispensable fuel requirements of those motor cyclists who need their machines in connection with their work, work which is of national importance.

There are probably over 20,000 motor cyclists in this country who come under this category, most of these being engaged in the engineering and shipbuilding industries.

Not a Joy-riders' Union.

The Union has no sympathy with, and will not in any way encourage, "joy-riding," though it does urge that in certain special cases a just claim can be made for a reasonable amount of recreative motor cycling.

The men in whose interests the Union has been formed work long hours—often thirteen hours a day for seven days a week, with a very large measure of night work—and as their work is of a difficult and arduous character, it is essential that their health should be well looked after. It is quite clear that if we are to get the best out of these men, who are working so strenuously to win the war, they ought to be looked after to the best of the nation's ability. They do not ask for much, but they do ask that they may be supplied with petrol or petrol substitute to the extent of two gallons a month, so as to enable them to get to and from their works quickly, and also in many cases to give them the only opportunity they have of seeing their families at least once a month. Numbers of these men live a considerable distance from the factories in which they are engaged; train journeys are slow, expensive, and not always convenient, while if they were allowed to travel by road they would often be able to make more time in the factory, and also get the benefit of a run in the fresh air instead of a ride in the crowded, germ-laden atmosphere of a railway train.

It is pointed out that if the whole of the motor cyclists in the kingdom were entitled to make a claim of the character indicated and were provided with, say, two gallons of petrol per month, the total consumption for one year would only be equal to about one-eighth of a cargo of petrol.

It is intended that no claim should be encouraged unless the case be a deserving one. It is, therefore, suggested that the applicant should get his requisition countersigned by his employer, and, further, that the Auto Cycle Union, as an independent body, should scrutinise every such application before submitting it to the Government Department concerned. It has also been suggested that the worker whose claim is admitted should carry a signed badge on some conspicuous part of the machine, showing its registered number and the name of the works at which he is employed, so that the information is available to the police at any time.

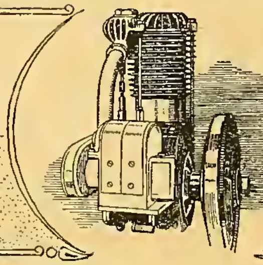
There is another aspect of the matter of which the War Office may not lose sight. Lord French has on more than one occasion reminded us of the possibilities of invasion. It would be of the very greatest value to the military authorities if they could rely on a body of motor cyclists in every munitions area who would be instantly ready with their machines in order to assist the troops. It is believed that the members of the Union would readily link up with the volunteer forces of the country if this became desirable, and would gladly accept this as a condition of their obtaining a supply of fuel.

Where to Apply.

All motor cyclists engaged in national work in need of the assistance indicated should write for particulars of this Union to the Secretary of the Auto Cycle Union, 83, Pall Mall, London, S.W.1, who will immediately put them into communication with the local secretary for that area, and assist in every way possible with regard to their claim.

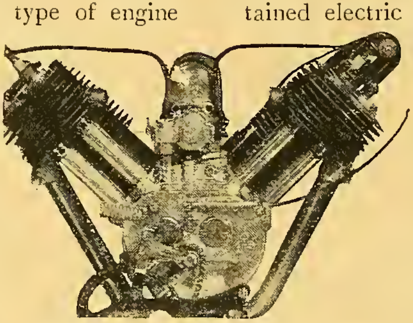
Major T. W. Loughborough, secretary of the Auto Cycle Union, is at present acting as secretary of the London Committee of the Union, while Mr. A. W. Torkington, a member of the Auto Cycle Union Committee, is the chairman. The aims of the Union appear to be perfectly sound and patriotic, and therefore it deserves the support of all motor cyclists who are engaged in national work.

Which Type of Multi-cylinder Engine?



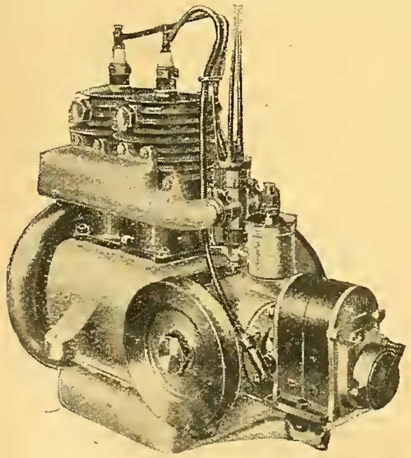
POST-WAR DEMANDS, AND A FEW NOTES ON VARIOUS ENGINE DESIGNS.

THREE types of machines that will find a ready market after the war are: (1.) A flat twin solo mount of, say, 3½ h.p., with overhead valves, outside flywheel, and hot stuff engine; three-speed gear with a wide diameter clutch, capable of withstanding indefinite slipping (with this type of engine one uses the clutch more than with any other type), and all chain drive, partially enclosed—a machine purely for solo work, weighing no more than a Douglas, capable of a speed burst of 58 m.p.h. and of easily holding 42 m.p.h. One of the chief aims in the designing of this mount should be the general reduction in weight. A magneto-dynamo in the flywheel might be utilised, and a much lighter gear box than those at present in vogue could be fitted. Mr. Harry Reed recently showed the writer a two-speed box no larger than a doughnut, which he used some years ago on a powerful racing tricycle having a solid drive. The whole thing weighed only a few ounces, and it proved conclusively that present-day gear boxes are unnecessarily spacious and weighty.



The 90° twin P. and M. engine—a beautifully finished unit of attractive layout. Note the magneto drive.

(2.) The type of machine that I would set down as marking a second ideal is a 5 h.p. three or four-cylinder dual purpose mount of approximately the same weight as the R.F.C., P. and M., having side by side valves, a well silenced engine, and four-speed gear. Outside its suitability for sidecar work, this machine would meet the demands of that vast number of riders who are neither speed merchants nor potterers, who like to ride a comfortable and controllable solo mount possessing ample power, and who take a modest delight in occasional speed dust-ups with other riders.



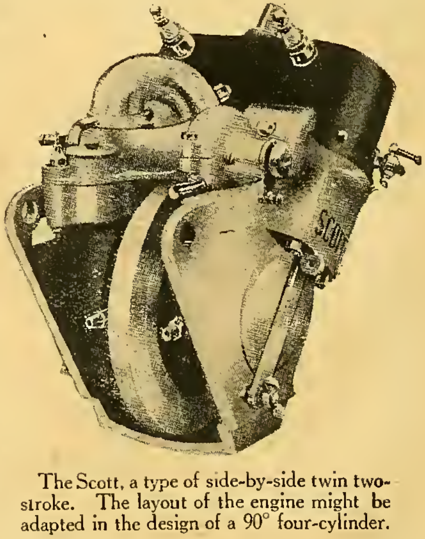
The Premier two-stroke vertical twin. The compact arrangement of the whole unit is at once noticeable.

(3.) Here again I would go all out for the vertical four-cylinder engine, and experience seems to indicate that 8 h.p. is the very lowest for all sidecar work and that 10 h.p. is preferable. A 6 h.p. engine needs to be kept in respectable tune if it is to take a luxurious family sidecar in all weathers, and in the model now advocated manufacturers might spread themselves out in the production of a *modèle de luxe*. Self-contained electric lighting, of course, shaft drive, three or four-speed gear box, and something really attractive in the way of finish. I would vote for the integral unit system, with a minimum of oil leaking joints, the flywheel clutch to be metal-to-metal, and, with the gear box fed with the overflow oil from the engine. Weight would not be a matter of much consequence, and 700 × 80 mm. tyres should be fitted. These are really a great comfort, and it is surprising how they enable one to drive fast over pot-holes without the least discomfort.

As regards the problem of spring frames, I am purposely leaving these out of the question. On our British highways and byways, if one is given a good saddle, a spring seat-pillar and large diameter wheels, one is happier than if in the possession of an inferior spring frame, but it is, of course, to be hoped that the really efficient article will result from the efforts now being made.

Balance and Torque.

While on the subject of ideal mounts it will be interesting to discuss the various types of multi-cylinder engines applicable to motor cycles. In deciding upon the disposition of the cylinders we are up against three ruling factors—balance, torque, and the question of housing the engine in a well designed frame. Balance is the most important of the three. By employing a perfectly balanced and consequently vibrationless engine, not only do we add greatly to the comfort of riding, but we are enabled to



The Scott, a type of side-by-side twin two-stroke. The layout of the engine might be adapted in the design of a 90° four-cylinder.

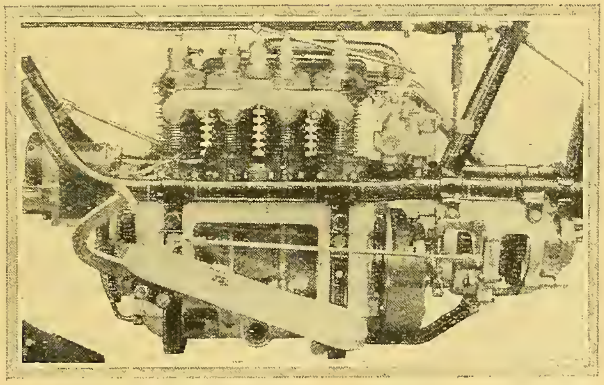
Which Type of Multi-cylinder Engine ?—

employ lighter frames and lighter parts throughout. It is on account of the perfect balance of the flat twin (taking it that the couple is practically eliminated) and the good balance of the four-cylinder, that the futures of these two types are assured, but there are one or two other types almost equally attractive.

As regards torque, I have come to the conclusion that with present-day high revving engines, anything within the limits of reason will do. Certainly it is not worth while to sacrifice the minutest degree of balance to obtain improved torque. Given a well balanced engine and a good silencer one is unable to tell at speeds over 15 m.p.h. whether the torque is good or indifferent. The 90° twin is inferior in torque to the 45°, yet there is no comparison between the two as regards sweet running. The 90° is an engine to be wholeheartedly encouraged in spite of its mediocre torque, while the 45° does not possess one single recommending feature, except that it enables one to cram two cylinders into the conventional type of frame without troubling and worrying to think out something better.

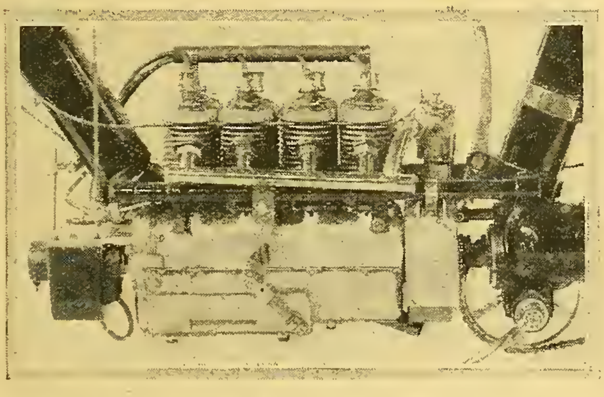
Housing the Engine.

The question of housing the engine is another point that may be lightly dismissed. It may delay for a time the general popularity of a certain type, but, if that type is good, it is bound to come in the end—as witness the flat twin! A few years ago the difficulty of housing the flat twin seemed almost insurmountable, but I have recently seen several new frame designs that leave nothing to be desired.

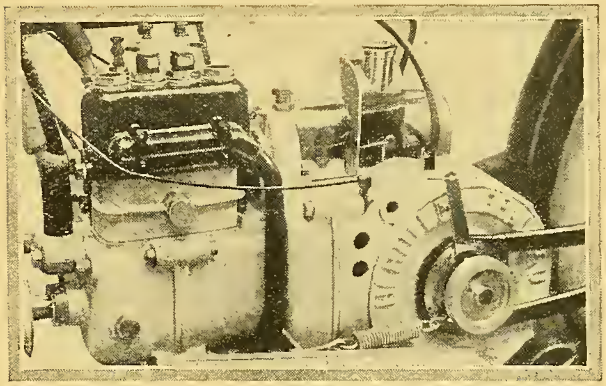


The four-cylinder F.N. unit, exhibition finish, the crank case being cut away to show the cranks *in situ*, similarly the flywheel to show the clutch—one of the neatest and most attractive motor cycle units ever produced.

The three-cylinder vertical is another type of engine which deserves more attention than it has received hitherto. Its balance is as good as, and in some respects better than, the four, though its torque is, of course, slightly inferior. The argument that it never met with success in car practice does not signify anything. In car design space under the bonnet is of little consequence, and if one could employ three cylinders one might as well go the whole way and employ four. Therefore there was nothing particularly to recommend the three-cylinder, whereas, in motor cycle practice, the length of the engine is all important, and the reduction of an inch or two here may remove a whole host of frame design difficulties otherwise to be met. The one objection to the four-cylinder, indeed, is the inevitably increased length of wheelbase it demands—brought about not only by the length of the engine but by the fact that the flywheel and gear box must be placed directly behind it, more or less amidship of the frame.



The Pierce, an American four-cylinder production, which presented numerous original features. Oil and petrol were carried in the hollow frame. Note the shaft drive and gear box housing. The whole layout of the unit is extremely neat and compact.



A 3 h.p. monobloc vertical water-cooled twin, a French production —Motocyclette Herdtlé-Bruneau of about 1913.

An Unconventional Design and Two-stroke Engines.

The 90° four-cylinder is another highly possible proposition, having its cranks and flywheel arranged similarly to those of the Scott, but with double big ends and cranks set at 90°. This engine would be easy to house and very accessible, while its torque would be excellent and its balance perfect. It would be vastly interesting to see what could be done in this line.

The side by side two-cylinder is off the boards for more than one reason. One must have either abominable torque or no balance at all. If the pistons move in unison, then one can obtain even firing intervals, but the balance is no better than in a single; if the piston strokes are opposed, then the balance is good, save for a considerable couple, but the torque is worse even than a 90° twin.

The latter remarks apply, of course, to four-stroke engines only. With the Scott two-stroke the power impulses are even, and, the piston strokes being

Which Type of Multi-cylinder Engine ?—

opposed, the balance is good except for the couple, which it is impossible to reduce below a certain point with this type of engine—hence a good deal of the wobble in a Scott frame.

It is a pity that two-stroke principles do not adapt themselves very readily to multi-cylinder engines, the matter of crank case compression rather upsetting the order of things. One type, however, suggests itself—a vertical three-cylinder two-stroke. Such an engine would be ideal in every respect, equal in balance and torque to a six-cylinder car engine, and its design could be pretty straightforward—a cheaper engine to produce than a three-cylinder four-stroke, and also lighter for the h.p. developed. If fitted with aluminium pistons and steel cylinders it would be readily adaptable for a very speedy solo mount, but of course there is the usual fly in the ointment—lubrication! I rather imagine that the problem of equalising the supply would cause the producer some sleepless nights, and the only method which suggests itself as being the least likely to cause unending trouble is drip feed into the induction pipe. Even then one of the three cylinders would inevitably be nearer the drip than the other two, and would probably take a good deal of the supply intended for its two brothers. Petroil would ensure all three obtaining an equal share, but no one who has tasted petroil likes it.

Those who talk about radials and rotaries for motor cycles are indulging in a flight of fancy, as these two designs may be set down as indicating the height of inadaptability. Already there is enough mud slung about by the wheels, and if a rotary engine joined in, distributing the slush from the front wheel and incidentally throwing in a little oil of its own, we may as well give up all effort at mudguarding. CHINOOK.

THE A.C.U., M.M.D.

An Important Role filled by Volunteer Motor Cyclists.

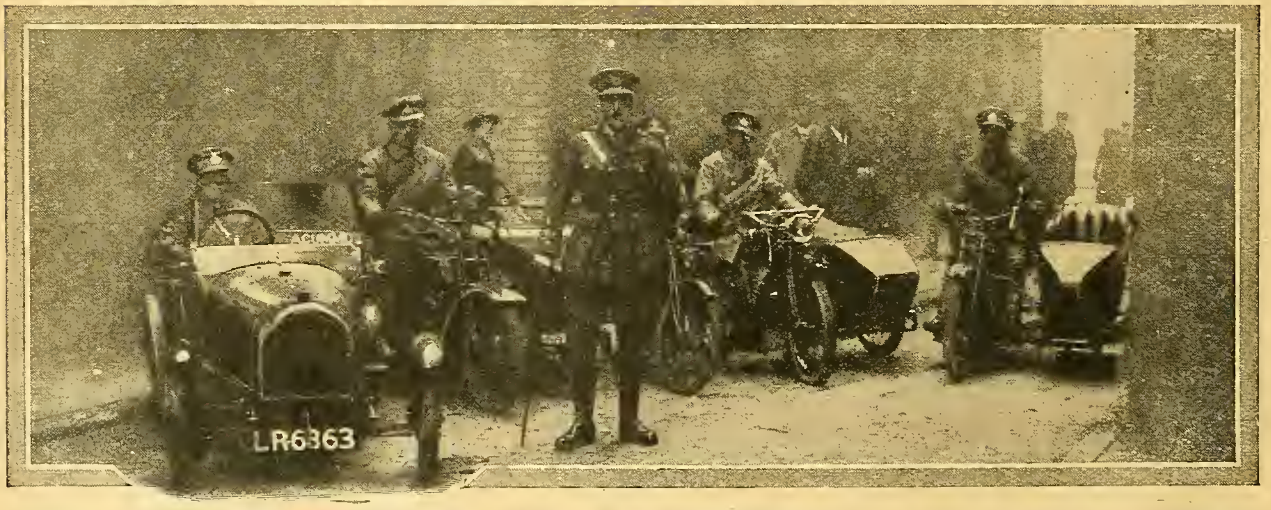
THE first messenger to be despatched on the A.C.U. Motor Messenger Detachment Service was sent away from outside the Central Telegraph Office on the 17th of December by Major T. W. Loughborough, secretary of the Auto Cycle Union, and an official of the G.P.O. at 12.11 p.m. He wore khaki uniform and was riding a 3½ h.p. Sunbeam sidecar combination.

These messengers carry despatch bags on their backs or strapped to their sidecars, in which important despatches are carried between various Government offices. They have a comfortable room in which they may wait at the C.T.O., in which there is a fire, telephone, and some comfortable chairs, while they have free access to the C.T.O. buffet.

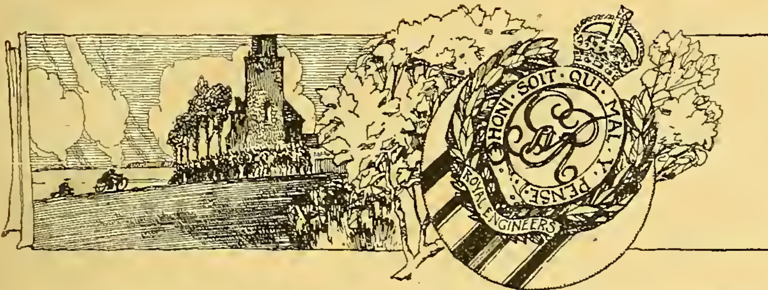
The men work in shifts and depart and arrive to schedule. Each shift is under the charge of a corporal.

Among the machines which were waiting we noticed a 1916 Indian, which looked practically a new machine. Its rider was the second man to be despatched. We also saw a 3½ h.p. twin-cylinder James, fitted with a wonderful array of additional cooling radiators. Over the exhaust valve cap was an aluminium fin cooler, while the two compression taps were screwed into devices of similar pattern but made of brass. There were as well a 2¾ h.p. Douglas, which was ridden by one of the A.C.U. staff who has joined the Service, and a 4 h.p. Douglas fitted with a Euk easy starter and Senspray carburetter. This latter was certainly a very easy starting machine.

The first messenger to be sent off was the only one who had succeeded in obtaining the armlet of the Detachment—a device in red, blue, and yellow—above which is worn the silver-plated badge of the detachment. The first man was unfortunate enough to stop his engine immediately after being sent off, but the delay was of short duration, and he was soon heard speeding his way on his machine.



A group of A.C.U., M.M.D., despatch riders waiting to be sent off. Major Loughborough, secretary of the A.C.U., is seen in the foreground.


HONI SOIT QUI MAL Y PENSE
ROYAL ENGINEERS

MILITARY NOTES.

TANK CORPS WINS ITS FIRST V.C.

THE Tank Corps has got its first V.C. in Act.-Capt. Clement Robertson. Though the *Gazette* does not specifically disclose the fact, there is little doubt that some of the V.C.'s were won in the recent fighting near Cambrai.

Capt. Robertson (a second-lieutenant in the R.W. Surrey Regt.) was deputed to lead the Tanks on foot. The *Gazette* says:

"Capt. Robertson, knowing the risk of the Tanks missing the way, continued to lead them on foot, guiding them carefully and patiently towards their objective, although he must have known that his action would almost inevitably cost him his life.

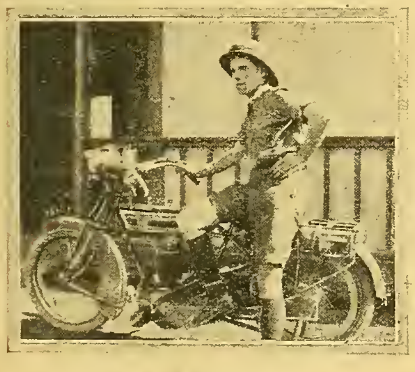
"This gallant officer was killed after his objective had been reached, but his skilful leading had already ensured successful action. His utter disregard of danger and devotion to duty afford an example of outstanding valour."

* * *

INLAND WATERWAYS TRANSPORT.

SPR. H. GIBBS, writing from Mesopotamia, says: "In common with my pals whom you see in the photograph, I have been somewhat disappointed in not seeing any reference to our corps or section of the Army in *The Motor Cycle*. I think there must be quite a number of old motor cyclists out here in this section of the Engineers, although we are now chiefly engaged on water-cooled marine or car engines installed in all kinds of boats. We long for the day when we shall be home again to try the favourite runs. Your mention of 'Ye Stonebridge Hotel' in the article on the Tilston engine brought me very near home—Erdington.

"I am thankful to have got safely through nearly twelve months' service here—chiefly in the workshops. We occasionally get a motor cycle to overhaul."



Sapper H. Gibbs, I.W.T.

THE TRAINING OF WOMEN FOR WIRELESS APPARATUS WORK.

WELL educated women are wanted immediately for training on urgent Government work in connection with wireless apparatus. Candidates must be between 18 and 40 years of age, and prepared to pass a medical examination. The course of instruction will be given in the electrical laboratories at the Polytechnic, Regent Street. During this period a weekly maintenance allowance of 25s. is payable. For further particulars apply Director, Training Section, Ministry of Munitions, 6, Whitehall Gardens, S.W.1.

Cpl. T. W. Parker, A.S.C.,M.T., formerly of *The Motor Cycle* editorial staff, whose interesting letter from Egypt was published in a recent issue.

* * *

KILLED IN ACTION.

ANOTHER motor cyclist who later took up flying has, we regret to say, been killed in action. This is Sec.-Lt. H. S. Holroyde, East Yorkshire Regt. He was educated at Tonbridge and Dulwich, and at the beginning of the war, at the age of sixteen, he joined the Kent Motor Cyclists, and was later transferred to the London Scottish. Subsequently he entered Sandhurst and obtained a commission in the East Yorkshire Regt., being attached to the Royal Flying Corps. On May 10th he was out with five other aeroplanes on a long-distance reconnaissance. They had to fight their way out and back, and just as they turned to come back Lt. Holroyde's machine was hit by one of the hostile aeroplanes, fell out of the formation, and was seen to dive steeply, with smoke issuing from it. A German machine dived down on it, but Lt. Holroyde opened fire and shot it down. Both machines were seen to crash almost in the same field.

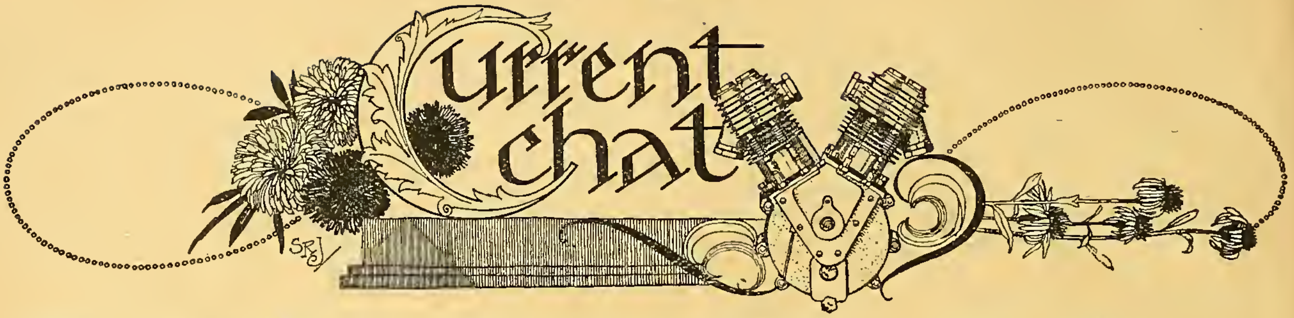
* * *

THE LATE P. C. D. DOUGLAS.

IN one of the casualty lists last week we noted, with very great regret, that Acting-Commander P. C. D. Douglas, R.N., had been reported as having died of injuries. Commander Douglas was one of the leading lights of the Public Schools Motor Cycling Club, and performed consistently well in various competitions at Brooklands and elsewhere on a 2¾ h.p. machine bearing the same name as himself.

We crave our readers' indulgence for again calling attention to his history during the present war. Just before hostilities began he met with a severe motor cycle accident through running into a cart in the dark, and injured his leg very badly. He was for about eight weeks in hospital, but as soon as he could hobble about he endeavoured to join up. He used every means in his power to persuade the doctors to pass him as fit, but without success. After much careful thought he endeavoured to deceive one of the recruiting medicos by hiding his limp by entering the consulting room with a sort of swaggering roll. This perhaps succeeded, but when he was called upon to strip the doctor spotted the scar on his leg, and naturally refused to consider him for a moment as being fit to join the Army. He was, however, determined to do some sort of work for his country, so he spent all his available cash in a Talbot landaulet, and, joining the R.A.C. Transport Service as an owner-driver, he became attached to one of the commands, continuing this work until he was quite fit. Then he joined the R.N.A.S., and served with devotion and gallantry until he met his death.

A group of engineers of the Inland Waterways Transport, Mesopotamia, the majority of whom were ardent motor cyclists before war broke out.



Current Chat

Times to Light Lamps.

GREENWICH TIME.

Jan. 3rd	4.31 p.m.
,, 5th	4.33 ,,
,, 7th	4.36 ,,
,, 9th	4.39 ,,

Lady Motor Cyclists.

Lady motor cyclists supplied by the Women's Legion, of 115, Victoria Street, London, are now being used by the R.F.C. and A.S.C., and are found as useful as the chauffeuses.

Motor Cycles in Valetta.

We recently had a paragraph to the effect that motor cycles were not allowed in the streets of Valetta, Malta. The editor of the *Malta Herald*, however, having taken up the matter with the Lieut.-Governor of the island, permission has now been obtained for the use of motor cycles in the streets of Valetta.

Catching Up the Spark.

One of the brightest Service magazines we have seen is *The Eagle*, which deals with life at a R.N.A.S. land station not a hundred miles from Edinburgh. Replying to a correspondent in trouble with the timing of the magneto on his motor cycle, the editor says: "The fault you describe is evidently due to what is technically termed 'magneto too far advanced'; in other words, the spark occurs before the engine is ready for it. Try running the engine faster, so that it may catch up the spark."

Another Unpublished Query!

An anxious querist recently wrote to us stating that he had a cylinder and piston and wished to build a three-wheeled monocar, would we please tell him how to proceed? The most useful suggestion was, we think, one put forward by the office boy, who overheard the ensuing discussion. "Tell him to scrap the cylinder and start afresh right from the piston as the centre of it all!" As a matter of fact this remark was wiser than its author probably realised, for with the coming of the aluminium piston and the added importance recently attached to piston rings, building your engine round your piston has a significance that a few years ago would have been quite impossible.

Police Intelligence

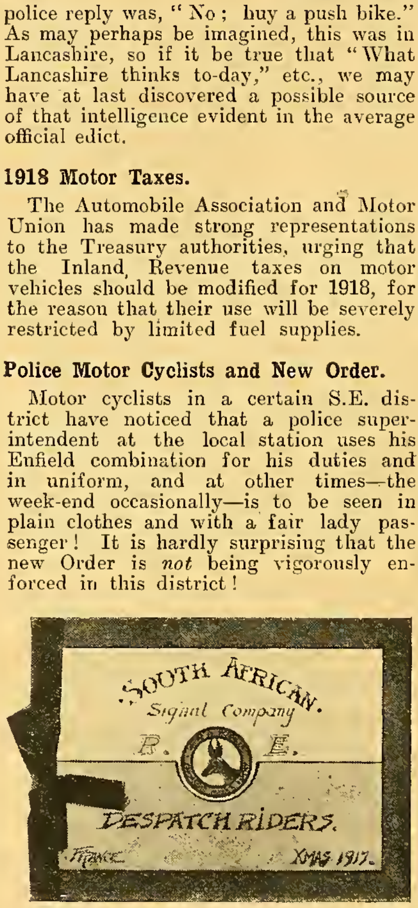
Another querist—one of many hundreds taxing our presumed omniscience in respect to the latest petrol restrictions—tells us that as he wanted to be on the safe side he asked the local police if he could use his sidecar to carry his wife and family to and from the station. The police reply was, "No; buy a push bike." As may perhaps be imagined, this was in Lancashire, so if it be true that "What Lancashire thinks to-day," etc., we may have at last discovered a possible source of that intelligence evident in the average official edict.

1918 Motor Taxes.

The Automobile Association and Motor Union has made strong representations to the Treasury authorities, urging that the Inland Revenue taxes on motor vehicles should be modified for 1918, for the reason that their use will be severely restricted by limited fuel supplies.

Police Motor Cyclists and New Order.

Motor cyclists in a certain S.E. district have noticed that a police superintendent at the local station uses his Enfield combination for his duties and in uniform, and at other times—the week-end occasionally—is to be seen in plain clothes and with a fair lady passenger! It is hardly surprising that the new Order is *not* being vigorously enforced in this district!



SOUTH AFRICAN.
Signal Company
R. E.
DESPATCH RIDERS.
FRANCE XMAS 1917.

Christmas greeting card received from "thirty despatch riders of South Africa XV. Corps, B.E.F., France."

Greetings from Despatch Riders of South Africa.

Among the many greeting cards received from the boys with the various Expeditionary Forces is an amusing one from a Signal Company attached to the R.E.'s, which we reproduce on this page. The inscription reads:

"*Cheerio! Hlala Gahle! Alles Zal recht Komen. Après la Guerre.*"

We're often in the mud,
But never in the dumps:
The country side's aflood,
There are bombs and frightful crumps.

The Boche is not a sport,
He doesn't play fair cricket:
So till he has been taught
We'll simply grouse and stick it.

Special Features.

WHICH TYPE OF MULTI-CYLINDER ENGINE?
FUEL LOSS AT THE CARBURETTER.
COAL GAS IN PRACTICE.

One Way with Trappers.

A motor cyclist, stated to be attached to the R.F.C., summoned at Greenwich for exceeding the speed limit, is stated to have said to the policeman when stopped, "I will see that you get a bomb the next time there is a raid on"!

Shelter Box for Westerham Policemen.

The policeman who daily does point duty at the junction of roads at Keston, on the Westerham Road, is to be provided with a shelter box, on account of the very exposed position. This is one of the most dangerous crossings in outer London, and the constable has averted many a smash, therefore he is certainly deserving of such shelter during the slacker hours of the day.

Motor Cyclist Relieves Food Situation.

Excellent work was done on a sidecarrier in the Cudham district last week. Owing to 4ft. snowdrifts, traffic on the Westerham road was stopped for several days, and residents who rely upon food supplies by road were in an awkward position, the local stores being sold out. Through the narrow cuttings made in the drifts the sidecarrier was able to proceed, making several journeys to and from London with supplies for the shops. Owners of local vans furnished the necessary petrol. In hilly, outlying districts, the sidecarrier clearly has advantages over the four-wheeler, particularly on snow and ice-bound roads.

Industrial Reconstruction Council.

The first meeting of the Industrial Reconstruction Council was held on Tuesday, December 11th, at the Holborn Restaurant. The chair was occupied by the President, Sir Wilfred Stokes, K.B.E., and the Draft Constitution submitted by the Provisional Committee was approved and adopted. Mr. Ben Tillett, M.P., who was one of the speakers, emphasised that the need of the future in any industry was not only efficiency of labour, but efficiency of capital, and Mr. Ernest Benn elaborated the objects of the Council rather more fully. He maintained that it was essential for each trade to have a self-governing body to maintain and develop the trade. The membership of this Industrial Reconstruction Council was to be open to any trade societies, the only necessary qualification being a genuine desire to promote the doctrine of industrial self-government.

Gas-proof Gasbags.

It may be of interest to our readers to know that the gas trailer we have under test is one of the cheaper variety sold by Messrs. Douglas S. Cox, of 6, Lansdown Hill, West Norwood, S.E.27. The "Superflex" container, which costs 20% more than the ordinary pattern, is guaranteed absolutely gastight and to remain fully charged for one week without any appreciable loss. It is further guaranteed for a period of six months.

The New Council.

In discussing the formation of the United Council (referred to in our current leading article), *The Autocar*, in its issue of November 24th, used what strikes us as a very apt metaphor. *The Autocar* said: "The Government has for the last twenty years regarded the motorist as a kind of goose that lays the golden eggs, and the fact that the goose has not been squeezed to death is accounted for more by the robust health of the bird than by any tenderness in its handling on the part of the Government."

Motor Cycling Schoolmaster fined for using Petrol.

At Greenwich, on the 24th ult., a schoolmaster at St. Saviour's Schools, Lewisham, S.E., was summoned for driving a motor cycle at 29 m.p.h. at Catford and also for "unlawfully using petrol." Defendant expressed regret for the first offence and pleaded "Not guilty" to the second.

Mr. Scard (for defendant) stated his client was granted a petrol licence for "the purpose of paying visits to the country and seaside to procure specimens for art and science training." When stopped he was riding to Hayes and Cudham to collect leaves and twigs. It being Sunday, no trains run to Hayes.

For the first offence a 10s. fine was imposed. The other, the magistrate decided, was intentional evasion of the Order. There were other places he could reach by train to collect the specimens. There must be a fine of 40s.

Motor Cycling in Hong Kong.

A report from Hong Kong, a British Colony, states that there has been a considerable increase in the use of motor cycles.

We remind our readers that Hong Kong is a British possession because we are told that practically all the motor cycles used out there are of American manufacture.

The A.C.U.M.M.D.

All through the Christmas week-end the recently installed Auto Cycle Union Motor Messenger Detachment, consisting of motor cyclists bearing important despatches between the C.T.O. and the principal Government buildings, worked without a hitch.

This service is proving itself to be of the greatest value to the country. All vacancies are now filled, but there is a waiting list.

Tyre Mileage.

We learn that a Melbourne motor cyclist has used a 26in. × 3in. white-ribbed cover fitted to the driving wheel of a 6 h.p. twin-cylinder motor cycle over a distance of 8,754 miles on the back wheel. It was then removed to the front wheel, and finished up with a total of 16,842 miles without being retreaded. The rider's weight was 14½ stone, and the machine was a heavy twin. Thus the performance is a meritorious one.

Rubber after the War.

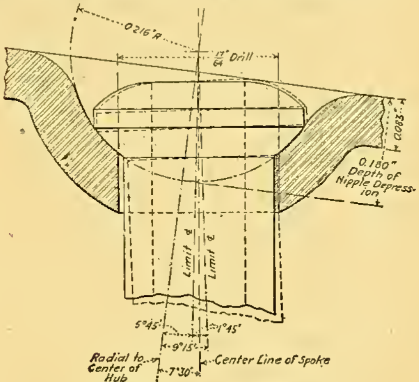
At the present time we are so obsessed by the double questions of fuel and legislation that we are inclined to pay little attention to another very important motoring attribute—rubber. But has any invention done more for the motor than the pneumatic tyre? Apparently America leads the world in the manufacturing aspects of the rubber trade, while England controls the productive aspects of the trade, and it is comforting to learn that after the war the production of tyres is likely to be well ahead of all demands.

A LITTLE HELP IS WORTH A LOT OF PITY.

"Knights of the present day" giving a hand to the owner of an Enfield outfit.

Standardisation of Motor Cycle Rims in America.

As most of our readers will be aware, motor cycle rims were standardised in England some two years ago, this act of standardisation being the result of investigations begun some two or three years earlier—in 1913. In the *Journal of Society of Automotive Engineers* (of America), dated November, 1917, a report is given of a meeting and discussion on the question of standardising not only American motor cycle rims, but also the depression in the rims for spoke nipples. Up to the present the depression in English rims for spoke nipples is left entirely to the maker's option, although some of the largest makers, notably the Dunlop Rubber Co., Ltd., have long been agitating for a standard depression as well as a standard rim. The measurements finally adopted for the depression in the rim are shown in the accompanying illustration, which is reproduced from the journal already quoted.



Motor cycle rim depression.

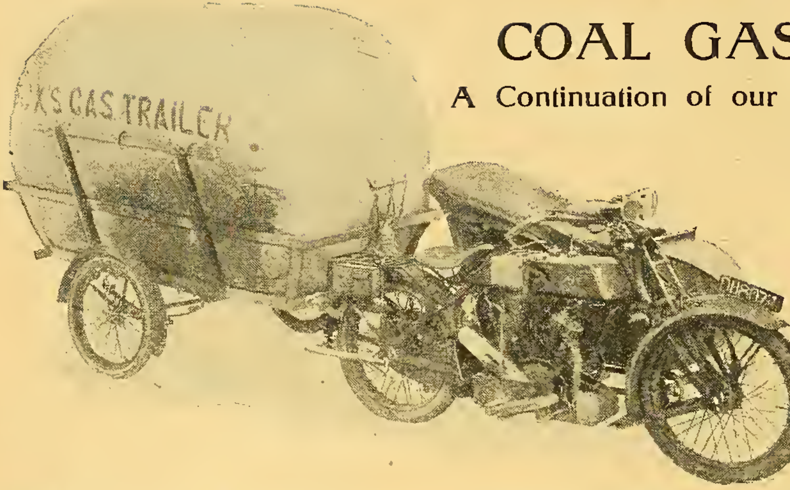
The advantages claimed for this particular depression are that it permits a perfect spherical bearing surface for the nipple when assembled with hubs of various lengths and diameters, and also a standard rim may be used for all motor cycle wheels with this same rim depression.

Motor Cycles in Brazil.

According to the *Motorcycle and Bicycle Illustrated* (U.S.A.), there are very few motor cycles in Brazil, and, moreover, there is no promising market. Bad roads and very high taxation have acted as a very efficient deterrent.

Home-produced Petroleum?

While comment at the present stage would be premature, much motoring interest attaches to a paragraph that appeared in the week-end newspapers concerning the discovery of paraffin in a well at Ramsey (Huntingdon). Two pumps, situated close together, were on Friday found to yield paraffin instead of water, and at the time of writing some 1,500 gallons of oil had been obtained, while the flow showed no signs of ceasing. For some years the water of the well, or wells, has given off a strong smell of paraffin, and a fatty substance has sometimes been seen floating on its surface. This is, however, the first time that the oil has been obtained in such preponderance over the water that it could be used for lamp oil and for fuel in a stationary oil engine.



COAL GAS IN PRACTICE.

A Continuation of our Notes based on the Daily Use of Coal Gas.

THE 6 h.p. A.J.S. motor cycle on which we are conducting our experiments with coal gas is badly in need of decarbonisation. With petrol as fuel a distinct "pink" is emitted with each opening of the throttle, and the condition of things is gradually becoming worse, but with coal gas, on the other hand, a decided improvement is noticeable, owing to the increased compression caused by the deposit. We have, accordingly, adopted a simple method of varying the compression to suit the fuel. For running on petrol a solid brass ring is placed under the exhaust valve caps, the ring being ⅛in. deep, and machined to assure a gastight joint, so that by raising the cap the compression space above the piston of each cylinder is increased in area, thus eliminating the knock. Before switching over to coal gas the rings are removed, and the caps screwed down on their copper and asbestos washers in the ordinary way.

Incidentally these distance pieces are very useful to any rider, as by their use one is enabled to postpone the necessary evil of decarbonising, while they save the engine considerably when a sidecar is occasionally attached to a mount not intended for that purpose.

We should imagine a Scott two-stroke would yield excellent results with coal gas—provided the gauzes were kept perfectly clean so as not to interfere with the volumetric efficiency of the engine.

In muddy weather the gasbag becomes thickly plastered with mud on either side, a constant cascade being thrown by the cycle and sidecar wheels. This accumulation naturally causes excessive chafing of the canvas at the points where it touches the carrier frame, while the repeated saturations will not tend to improve the gas-retaining properties of the fabric. Similarly, the trailer wheel bearings are subjected to an incessant shower during wet weather, and very soon become full of water and grit unless repeatedly packed with grease. We have been compelled to fit both the machine and the trailer with wide mud interceptions, consisting of flaps of linoleum and American cloth, or the life of the gas container would have been a short if merry one. Though these fitments do not improve the appearance of things, one might as well go the whole hog when towing a gas trailer and drop all thoughts of appearance.

A Non-stop Run.

Recently an extended business trip enabled us to test the road capacity of the bag on a non-stop run. We left Coventry with the container fully inflated, and the first ten miles on a good open road with a strong cross wind was covered in twenty minutes, which may be taken as comparing very favourably with petrol. Also very little gas was used.

At this point, however, we were compelled to leave the main road and proceed by little-frequented byways, abnormally heavy with mud deposited by farmers' carts from the fields, and against a powerful wind. Our speed at once dropped down to an average of 20 m.p.h., which may be taken as 5 m.p.h. slower than would have resulted from petrol. Also our consumption went up enormously, and at the end of twenty-three miles it was necessary to recharge the container. This yields a result equivalent to 46 miles per gallon on petrol, while under similar conditions, with that fuel, we have never obtained less than 58 miles per gallon.

Though when running normally the engine does not overheat, its weary flogging becomes somewhat monotonous under continuously perverse conditions. If much gear changing is done the consumption goes up at an alarming rate, and it is found profitable to stick to top gear, for no amount of continued slogging causes the engine to "pink." It will climb almost anything on top gear at its own speed, while the rider can doze in the saddle, unharassed by the necessity for niceties of mixture or delicate fingering of the clutch.

A Starting Tip.

Discounting the equipment necessary for its use, coal gas as a petrol substitute is very much preferable to the paraffin makeshifts, as, given a correct mixture, no difficulty is obtained in starting, and no knocking or other disconcerting symptoms accompany its use. Pressure feed systems will need to be very delicately applied, however, for it is an easy matter when cranking round the engine to flood the cylinders with gas, in which case it is impossible to obtain a start till the engine has been turned over a few times with the exhaust valve lifted and the gas turned off, thus completely getting rid of the old charges. With the container fully inflated and feeding a supply under slight pressure, we have, on many occasions, experienced the utmost difficulty in starting.

GAS FOR MOTOR VEHICLES.

Use for Essential Purposes only.

THE Board of Trade announces that, with the concurrence of the Petroleum Executive, it has been decided that the use of gas for motor vehicles is to be brought under the same regulations and restrictions as the use of motor spirit. It is stated that the reasons for this step are the serious position resulting from the deficiency of tonnage and the probability that circumstances may arise at any time which will require the further reduction of the supplies of petrol available for civilian purposes, and the urgent necessity of reducing to the absolute minimum the expenditure of labour and materials for other than war purposes. Its object is to provide that, to the extent that gas may be available, it shall be used only for essential needs in substitution for petrol, with the object of reducing the consumption of the latter wherever practicable and of conserving stocks.

It is recognised that a certain number of vehicles have already been fitted for the use of gas, and, wherever possible, permits will be granted in these cases to enable such vehicles to be used for essential purposes, as indicated by the Motor Restriction Order. It is not intended to prohibit the use of gas for motor vehicles in so far as, subject to other considerations, it may be available, nor to license the quantity that may be purchased, but only to confine its use to the purposes stated. The best methods of the adaptation of gas for driving motor vehicles and questions relating to the safeguards against any danger attending its use are the subject of investigation by Mr. Walter Long's Committee on Gas Traction.

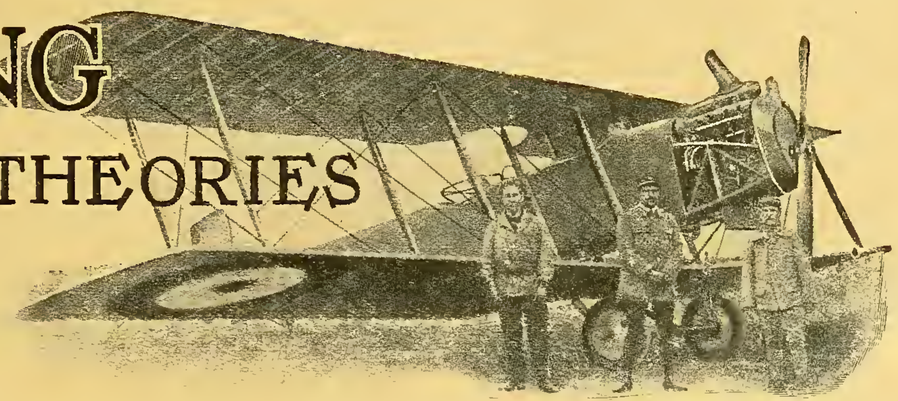
It is proposed to issue shortly a new Order consolidating and amending the present Motor Spirit Restriction Orders, and the regulation of gas will be dealt with in a new Order, also to be issued in due course.

FLYING FACTS AND THEORIES

MORE ABOUT TURNING.

With Special Reference to Some Correspondents.

By W. G. ASTON, A.M.I.A.E.



L'Automobile aux Armées

NOTHING could possibly have been more grateful and comforting to me than the volume of contentious correspondence that my articles on flying have aroused. They were initiated purely for the purpose of imparting information, but they could never have been so informative as the discussions they have set in motion. Not having two separate identities I can only advance one side of an argument at most, and though I try to anticipate any objections that may arise it is obvious that much must be left unsaid. I cannot dot every I and cross every T, otherwise I could never cover any ground at all. This unfortunate fact brings me into opposition with such people as "O.J.F.S.," Lt. R.F.C., who, in *The Motor Cycle* for December 20th pops up with a criticism which bears no resemblance at all to his original attack, but deals with points that he must be perfectly aware I gave the reader the credit for inferring.

First as to the fact that I am not a pilot. I have already expressed my regret at this lamentable state of affairs, and can only say that my disability in this direction is outside of my control. But I repeat, neither my regiment nor my rank has any influence upon facts as facts: they would still be facts even if I were a squadron commander. I disavow any invidious comparisons, but I would remind "O.J.F.S.," etc., that the greatest authority on flight in this country, or in the world, for that matter, is also not a pilot, so that, at all events, I sin in good company.

If a theoretical knowledge is found to be at variance with practice then it is obvious that the theory it endorses must be wrong. But I entirely fail to see in what direction I have been proved wrong; taking one of my sentences away from its context and turning it into a generality which was manifestly never intended by me, does not in the least prove me wrong.

The Loss of Height on Turns.

Take this excerpt, for example, as quoted by "O.J.F.S." "If the throttle is not opened at the moment of making the turn, the machine will lose height." This is not a general truth, but it is perfectly true in regard to the conditions in which the statement was made, namely, if the speed of the machine is kept constant on the turn and during the turn is equal to the previous horizontal speed. I should be sorry even for "O.J.F.S." to think I am so ignorant that I do not know that an aeroplane can climb whilst turning. Further, it is clear that it can do so without the throttle being opened at all, but to do so it must lose speed. If a turn is made without losing either height or speed, such an evolution requires more power from the engine.

Again, if an aeroplane is gliding with the engine cut off it can make a turn and retain its speed only by losing height. Conversely it can make a turn and retain its height only by losing speed. It is merely a case of transforming potential into kinetic energy and *vice versa*. If the machine is doing a very fast glide the excess of kinetic energy it possesses may be sufficient for it not only to retain its height during the turn but actually to gain additional height, but needless to say this requires a corresponding diminution of speed.

Height and speed, within the limits imposed by the minimum and maximum speeds of the aeroplane are always interchangeable, as they represent merely different conditions of energy. If a machine is flying or gliding at its maximum speed it can attain height by losing some of its speed, but it must not lose so much that it gets below its stalling speed. On the other hand, given sufficient height, it can attain its maximum speed by a sacrifice of some of that altitude, but beyond its "limiting speed" it will gain nothing. This, of course, is a very high speed indeed, and is probably never attained in practice.

Air Fighting.

Whether or not an aeroplane has an engine of such power that its speed variation is big, or small, when it makes a turn it is bound to lose something—height or speed, or both, and it can only keep them both constant by making a call on such excess power as the engine possesses. I can hardly think that "O.J.F.S." genuinely failed to credit me with knowledge of this fact. If he did, he appears to have been all alone except for his *confrère* "F.M.C.H." (also Lt. R.F.C.) who took me up on the same point. The latter says, "It is perfectly easy to climb on a turn." Whoever denied it? Not I certainly. But one must concede either a loss of speed, or more power from the engine, nevertheless. "The air fighter . . .," says this officer, "is dodging and twisting all the time. His throttle is used quite a lot as it is, but on every turn! I suppose the sharper the turn the greater the increase." May I again remind "F.M.C.H." that the dodging and twisting air fighter is not maintaining a constant speed by any means, and that my original

Flying Facts and Theories.—

statements were made distinctly on the assumption of such constant speed. If the pilot is content to make his turns at the expense of either height or speed it is clear that he need not bother about his throttle at all. "The sharper the turn the greater the increase (of throttle)! Most decidedly *yes*, "F.M.C.H.," provided, once more, that neither speed nor height be lost.

Mathematical Proofs.

I next have to thank Sec.-Lt. J. H. Gotch, R.F.C., for his most appreciative letter. His explanation of turning "up" and "down" wind is precisely similar in results to mine, though not quite so elementary. I preferred to express myself non-mathematically so as to interest as many people as possible, and if certain pilots, whose railway carriage conversation I have chanced to overhear, were so grossly ignorant as to hug the fallacies I was trying to expose, it was obvious to me that they would understand only the very simplest of arguments. If all readers of *The Motor Cycle* had a sound grounding in elementary physics, most of its technical articles could be condensed to a mere paragraph, and some of its most valuable ones would be rendered entirely superfluous.

I likewise have to express my gratitude to "Commonsense" for his appreciation.

In a long connection with technical journals I have never before come across the type of correspondent typified in "Dyne." Gratuitously to write a second letter on the heels of his first and to admit his mistake was an action which I should say is quite unprecedented. It is quite the greatest compliment I have ever had paid me, and I thank Mr. "Dyne" very much indeed. Most correspondents take a running pot shot at a contributor, and there is always a doubt whether they even see the issue in which he replies to them.

Radial and Rotary Engines.

In answer to L.-Cpl. S. A. Reeve, who has certainly quite justifiable criticisms to offer on my article on radial and rotary engines, may I say that I am perfectly aware that the types of engine I described are more or less out of date, but I was dealing only with broad principles which were just as well illustrated by them as they would be by the latest radial and rotary productions. L.-Cpl. S. A. Reeve is in the Army. So am I. I have been lucky enough to get permission to write these articles, and I am certainly not going to abuse my good fortune by dealing with designs which in everybody's interest should be kept in the dark. There is far too much cackle as it is about the new things that are being made, and I should be the last to flaunt such information about them as I possess in a public newspaper. So for the time being I must be content to appear a little out of date, though sound fundamental principles never can be.

The L.-Cpl. says, "I suppose Mr. Aston is alluding to the stationary radial when he refers to large quantities of unused oil being blown through the exhaust pipe, for up to the present I think there is only one rotary radial engine which has exhaust pipes fitted." The answer is in the negative. Do not let us waste time over obvious trifles. For "pipe" read "valve" if you like. It is in this case a distinction without a difference.

Centrifugal Force.

Getting back to the question of turning an aeroplane, and especially referring to the fact that embryo pilots are impressed by their instructors with the danger of turning down wind close to the ground, there is one point which has escaped all my antagonists. I also left it out of my article because, as far as I am concerned, the space occupied by a contribution is strictly limited, and one cannot deal with all possible aspects of a thing at once.

When an aeroplane turns its weight is virtually increased by its centrifugal force, and since its stalling speed is a function of its loading it is obvious that on a turn this critical speed will be raised. The same thing applies to looping, and especially to very sharp turns, when, of course, the centrifugal force reaches its maximum. Now when a pilot turns down wind, and glances towards the ground, he finds that to keep the position he expected to have relatively to the earth he has got to make a much sharper turn than he intended. Such a turn may be so sharp as to make the machine's stalling speed higher than that at which it is actually trying to fly, with the result that a crash ensues. Such a state of affairs is easily prevented from occurring by an opening of the throttle, but if the engine is failing this safeguard cannot be used. In the case of a pilot turning up wind the danger is just as much present, as such a turn tends to make him underbank. On the other hand, his apparent ground speed is not so high, and this may make the conditions appear easier, though it is, of course, an optical illusion, for the conditions are identical as far as the aeroplane, as an aeroplane, is concerned.

The Feel of the Machine!

One final remark touching upon a last point in "O.J.F.S.'s" letter. He says I "appear ignorant that one turns by the horizon and the feel of the machine, and not by watching the earth, so that a knowledge of the wind is unnecessary." Now, the last sentence might well have been taken as a text for my original article, since without any knowledge of the wind there is obviously no such thing as "up" and "down" wind—the very thing I set out to prove. As to watching the horizon and not watching the earth, which is what the horizon is made of, this seems rather a difficult feat. Next as to the "feel" of the machine, this seems a singularly inexact method of doing things, and what, after all, *is* the "feel of the machine"? Does he refer to the feel of the relative wind against the pilot's face, by any chance? Again, how does one see the horizon when one is in a cloud?

To consult "a series of comic speedometers and protractors to measure his speed and angles" may be beneath "O.J.F.S.'s" dignity, but I would recommend an occasional glance at them in order to see that his "feel" is properly calibrated. No wonder there are crashes!

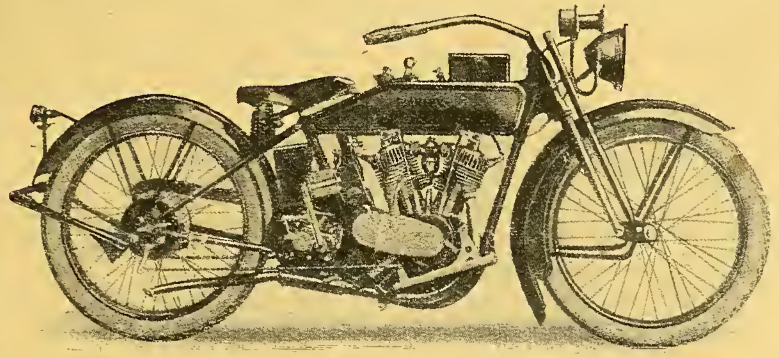
GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

Refinements in the 1918 Harley-Davidson.

Various Improvements in the Power Unit and a Strengthened Frame Construction.



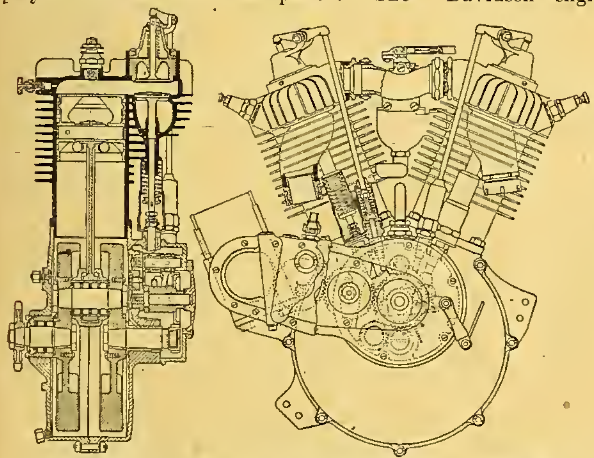
The 1918 Harley-Davidson. So far as the general appearance is concerned no alteration has been made, the improvements consisting of minor refinements.

FOR 1918 the Harley-Davidson Co., of Milwaukee, who are sharing largely in the American Government contract for military motor cycles, have three models to set before the public. These are Model 18E, a single-speed solo mount; 18F, a three-speed model with magneto ignition; and 18J, a three-speed electrically-equipped model. These machines are adaptable either for solo or sidecar use, and it is an interesting point that the Harley - Davidson people have adopted a measure which we have many times recommended to owners of low-powered machines that are put to sidecar use. There is no difference in the Harley-Davidson machines intended for sidecar attachment and those intended for solo use, except that when sidecar requirements are specified, specially stocked distance pieces or joints are fitted between the cylinders and the crank case, so as to reduce the compression.

Power Unit.

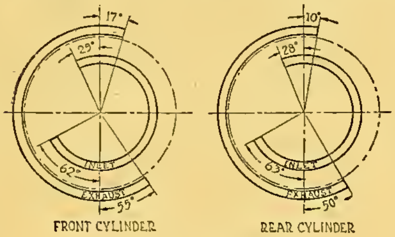
The 45° twin so generally favoured in American practice, on account of the ease with which it can be adapted to a motor cycle frame, is, of course, retained. The cylinders and cylinder heads are in one piece, and very large integral cooling flanges are employed. The exhaust valves are contained in air-cooled pockets, the inlet valves being placed directly above. The cylinders have a bore of $3\frac{5}{16}$in. × $3\frac{1}{2}$in.; cubic capacity, 60.34 cubic inches, which is slightly under the 61 cub. in. capacity (approx. 988 c.c.) set in the States by motor cycling racing rules.

In no particular feature does the engine depart from standard practice. Three rings fairly wide apart are employed in the cast iron piston. The gudgeon pin is more than halfway down the piston, so that the wearing surface is more evenly distributed above and below the pin than is usually the case. The gudgeon pin is secured in the piston by means of a cotter inserted through a hole in the piston skirt.



Sectional view of the Harley-Davidson engine. It will be observed that both plain and roller bearings are used.

A feature of the Harley-Davidson engine is that in its main bearings, including the crank bearing on the driving side, rollers are used. It will be observed that the crank bearing on the timing side is plain, and, with reference to the engine drawings we give, readers will note the neat provision made for enclosing the valve tappets. This system has proved entirely satisfactory, and Harley-Davidson engines are notable for their cleanliness and absence of metallic clatter. The overhead rockers, as hitherto, are left open, the enclosed rocker not having yet come into use in American practice. The big ends are of rather unusual design, one of the connecting rods being yoked, while both bear directly upon the crank pin, instead of one bearing upon the other. The small ends are provided with bronze bushes.



The valve timing.

Valve Mechanism.

The valve mechanism is of special interest. It will be observed that the cams actuate rocker levers provided with cam rollers at their extremities. A peculiar cam contour is employed, giving the unusual valve openings shown in the diagrams. It will be observed further that the diagrams are different for the front and rear cylinders. The inlet valves open gradually, but remain fully open practically to the end of the inlet stroke, whereas the exhaust valves attain their full opening at the beginning of the exhaust stroke, and are very slowly closed. A very considerable overlap is permitted. It will be seen that there are small springs at the lower end of the tappet rods which tend to keep the tappets in contact with the cams.

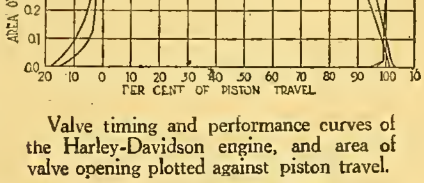
Lubrication.

Except for minor refinements, the mechanical oiling system remains unchanged, the original simple adjustment being provided, while the mechanical pump is assisted by a hand pump on the tank. The oil passes through a small glass sight-feed adjacent to the pump. It is fed to the timing gear case and to the crank case from which the engine is mainly dependent upon splash feed.

Ignition and Timing.

In the magneto models a Berling magneto is used, while in the electrically equipped model the usual American battery system is employed. The generator in these models is a shunt wound machine with automatic control, generating a supply of six volts pressure.

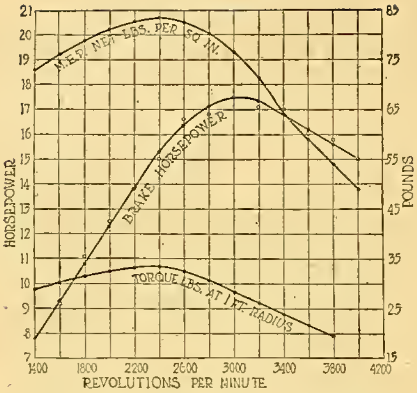
Reverting once more to the valve timing, it is particularly interesting to note that it is unequal for the two cylinders. This is due to the fact that the rocker levers for one cylinder are the reverse of the rocker arms for the other cylinder; thus the valve lift on the front cylinder is somewhat greater than that of the rear cylinder, and the opening period



Valve timing and performance curves of the Harley-Davidson engine, and area of valve opening plotted against piston travel.

Refinements in the 1918 Harley-Davidson.—

is slightly longer. The cams are unsymmetrical, giving a quick opening of the exhaust valve and a quick closing of the inlet. The horse-power, torque, and m.e.p. curves shown herewith were obtained with an engine having this valve setting. The m.e.p. attains a maximum value of 83 lb. per square inch, and at high speed the maximum value is 76 lb. per square inch. The compression ratio is 4.12 to 1, and the valve diameters are 1⅝in. inlet and 1½in. exhaust.



Horse-power, torque, and m.e.p. curves.

Transmission.

As regards the transmission, the clutch lever is interconnected with the gear control, so that it is impossible to shift the gears until the clutch is disengaged. Both ball and roller bearings are used in the transmission, the clutch being mounted on a double roller bearing with a felt ring saturated with oil between the two.

The original Harley-Davidson spring seat-pillar is retained, and, as Harley-Davidson riders know, it is a great acquisition. Such slight frame alterations as have been made tend in the direction of affording greater strength for sidecar use, for which purpose the general layout of the machine is specially suited. It is noticeable, indeed, that the attachment of a sidecar makes no difference to the road speed of the machine.

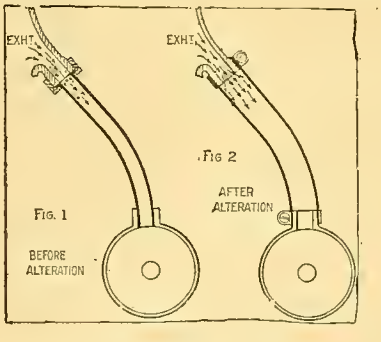
It will be seen from the foregoing that most of the alterations are of a minor description, though they should give greater all-round efficiency in this attractive and sweet-running mount.

IS THE EXHAUST THROTTLED?

A Mysterious Diagnosis of a Baffling Difficulty.

SOME months ago I undertook the job of tuning up a not very ancient 3½ h.p. machine. I quickly got it into a state in which it started easily and ran nicely. It would, however, persist in petering out on hills. I tried plugs and generally recognised ways of remedying this, all with no effect. Eventually, one afternoon, after spending a solid hour in "thinks" over the job, I picked up a brain wave sent out evidently from some high power wireless station—located perhaps in the Coventry district. From whatever source it emanated, its message was plain, though faint at first—"Exhaust pipe" it tapped out repeatedly.

Now the exhaust pipe was clear enough, as I well knew, and the silencer having been recently eviscerated was nothing but a box with holes in it. I could not, however, ignore, a persistent communication of this sort, so I continued to look at the exhaust branch. After a time this is what I saw (fig. 1). I do not know that it is exaggerated, but should it appear so one must put it down to the unusual experience of a brain wave. Fig. 2 will show the alterations made by means of some light piping with saw slots in each end and metal bands for clamps.



Figs. 1 and 2.—Showing the exhaust pipe before and after alteration

The result was all the difference in the world as regards climbing. I could climb my test hill *slowly* and on half throttle, whereas before at whatever speed or throttle I made the attempt I was baulked every time.

Importance of a Clean Exhaust System.

We talk glibly of ample exhaust passages and smooth outlets, and of silencer baffles setting up obstructions, but it will be found on many models that the first constriction occurs at the exhaust pipe, with the consequence that the exhaust is badly throttled, especially at or in the neighbourhood of full load.

Take sketch No. 3. At the time the exhaust valve opens on the power stroke there may be 30 lb. to 40 lb. pressure in the cylinder. This pressure has to fall to atmospheric pressure in 1/150th part of a second if there is to be no excess back pressure when the piston commences its upward stroke (considering engine running at 1,000 r.p.m.) It is of the greatest importance, therefore, that this 30 to 40 lb. should be dissipated *instanter* (or as nearly so as possible). Any obstruction to easy exhaust has immediately two bad effects: (1.) The piston has more negative work to do. (2.) The cylinder gets hotter.

There is something to be said for exhausting directly into a bulb on the cylinder exhaust outlet or for fitting a silencer direct to the cylinder, as shown recently in the case of a small two-stroke engine illustrated in *The Motor Cycle*. This last idea is by no means new. I well remember an old Rex of some thirteen years ago, one of the drop-tail-tank breed which was fitted with a silencer direct on the cylinder. No doubt it is an ugly method, but it ought to be possible to get improved results without a maximum of ugliness.

ENGRO.

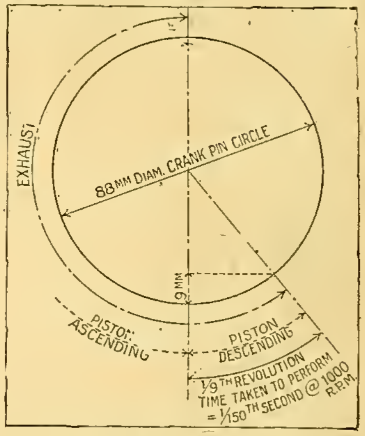


Fig. 3.—Illustrating the short period that occurs to enable the exhaust gases to be expelled.

* * *

A LIGHTWEIGHT RECORD.

AT Seattle recently G. C. Austin started what will probably be the first of a series of twenty-four-hour runs for lightweight machines. Mounted on a Cleveland two-stroke, Austin covered 542 miles in twenty-four hours. His actual riding time was 20h. 26m., and his average speed, therefore, 25⅜ m.p.h.

The course consisted of a round trip of 63.8 miles, which, on the fastest round, was covered in 2h. 10m. Heavy rain, fog, and powerful winds were encountered throughout the trial, the roads for the most part being so slippery that a powerful sidecar outfit was unable to hold the pace. Austin's dry battery lighting installation became "a wet battery," and through most of the night he rode in pitch darkness, assisted occasionally by a hand flashlamp. He states that, given decent luck, he hopes to knock off 700 miles in twenty four hours at an early date.

THE INSTITUTION OF AUTOMOBILE ENGINEERS.

AT the Royal Society of Arts, John Street, Adelphi, W.C., on Jan. 9th, at 8 p.m., Professor Groom will read a paper entitled "The Artificial Seasoning of Wood." Cards of invitation to the meeting may be obtained from the Secretary of the Institution of Automobile Engineers, 28, Victoria Street, Westminster, S.W.1.

RUSHING INTO PATENTS.

A Little Lesson on the Unwisdom of Blindly Patenting any New Idea, with an Example drawn from a Recent Advertisement in "The Motor Cycle."

THE person who will rush into print on the slightest provocation is fairly well known, and, generally speaking, is not altogether regarded as an example to be emulated. The one that rushes into patents on the slightest pretext is a little less common, but is, however, equally liable to create awkward situations and disappointments for others as well as for himself. Many people seem to think that any new idea—that is, an idea that is new to themselves—has only to be patented and their fortune is assured. They do not seem to regard it as essential that their idea should offer distinctive advantages over existing practice, but merely that it should be something new. Even if it be really new, in accordance with their ideas, the possibilities that someone else has previously worked out a similar arrangement never appear to occur to this class of person, and oftentimes a man will spend some considerable time, energy, and money in perfecting an idea, only to find, after his patent has been filed, and sometimes even the article placed on the market, that a prior patent exists.

Examples of this type of occurrence are very numerous in the motor trade, and many a budding inventor has been cruelly disappointed to find that the fruits of his labours have been forestalled, sometimes by a matter of some years. Spring frames especially are a fruitful source of this kind of disappointment, and many ideas have been put on the market for springing, both of motor cycles and of sidecars, only for the inventors to discover that they are infringing someone else's previously-granted patent.

A Startling Advertisement.

The present fuel restrictions have turned many inventive minds to the consideration of possible solutions of the fuel difficulty, and one or two persons of the stamp we have in mind have even gone so far as to patent a recipe for petrol substitute, consisting of such ingredients as methylated spirit, colza oil, and paraffin—a mixture long well known and already worked to death in experimental circles. Similarly, a considerable stir was caused by an advertisement in *The Motor Cycle* of October 11th last of a device by which it was claimed to be possible to run one's motor cycle without petrol or paraffin, and this by means of the employment of a special carburetter. The advertisers of this new device were immediately so inundated with enquiries that it became absolutely impossible to answer them all, and many correspondents wrote to us complaining that one of our advertisers (Messrs. Rogers and Henderson, of Gateshead-on-Tyne) had apparently let them down. Several correspondents had gone to the extent of enclosing cash in letters, but we understand that in every case the money has been returned.

Following our usual practice, we took the first opportunity of interviewing this firm, as ordinary letters and telegrams from us bore no more fruit than those from other correspondents. Our representative who interviewed the firm in question found that the carburetter advertised had not been actually manufactured, but that a patent had been applied for, and that before beginning manufacture the patentees considered it advisable to test the market; consequently the advertisement was inserted in *The Motor Cycle* simply as a feeler to determine which way the wind blew. The result of the advertisement was, of course, only what anyone moving in motor circles at the present time would have expected, and the patentees soon came to the conclusion that to satisfy the enormous demands put upon them they would require extensive plant and considerable capital. This was as much information as our representative could gather, and he did not succeed in getting any particulars of this new device.

The Invention!

Recently, however, owing to some private difficulties, one of the patentees has disclosed to us the nature of this invention, which simply consists of an acetylene generator, the idea being to put on the market a special acetylene generator capable of replacing the ordinary petrol tank and thus enabling acetylene to be used as a fuel!

There is perhaps not a single reader of *The Motor Cycle* who does not know that acetylene has been the subject of experiments as a motor fuel for very many years, and that in spite of research work expended on the subject, no real success has yet attended the attempts. There is, of course, no question whatever about the possibility of acetylene as a fuel. The difficulty arises over its suitability and its convenience, and there is no need to enter here into the various reasons why acetylene has hitherto been discarded as impracticable for all ordinary purposes, and this quite independently of the cost aspect of the question. Moreover, at the present time carbide is unobtainable.

"The inventors" of the device to which we refer were apparently not regular readers of *The Motor Cycle*, and when they found that a motor cycle engine could be made to run on acetylene they considered their discovery to be one of far-reaching importance Hence, it was their intention, after making sure that a market existed for their device, to place this panacea of all evils before the motoring public.

This explanation will perhaps be welcomed by very many of our readers who wrote for particulars immediately this advertisement appeared, and who have had no replies. It also serves to adorn the tale, and to point the moral with which we introduced these remarks.

We cannot do better than reiterate our advice to all inventors that, before they spend money on patenting, or preparing for the manufacture of any of their designs, they should search most conscientiously all possible records to make quite sure that their idea really is new. By adopting such a course they will save themselves from much bitter disappointment.

A SOLDIER-AUTHOR.

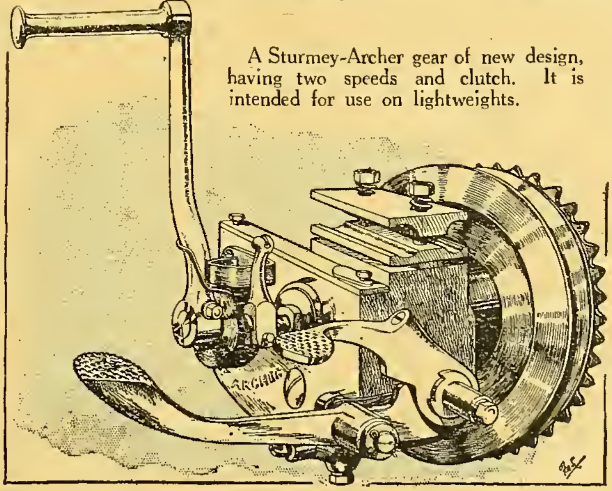
IT is not often that our soldier readers shine in the direction of authorship as well as military prowess. Capt. S. Bramley-Moore, however, has just blossomed out as an author, and a very able one, too. He was one of the very early motor cyclists, and in 1904 was a partner with Frank Hulbert, of the Triumph Cycle Co.

On the outbreak of hostilities, Capt. S. Bramley-Moore joined the A.S.C., and later was awarded the Military Cross.

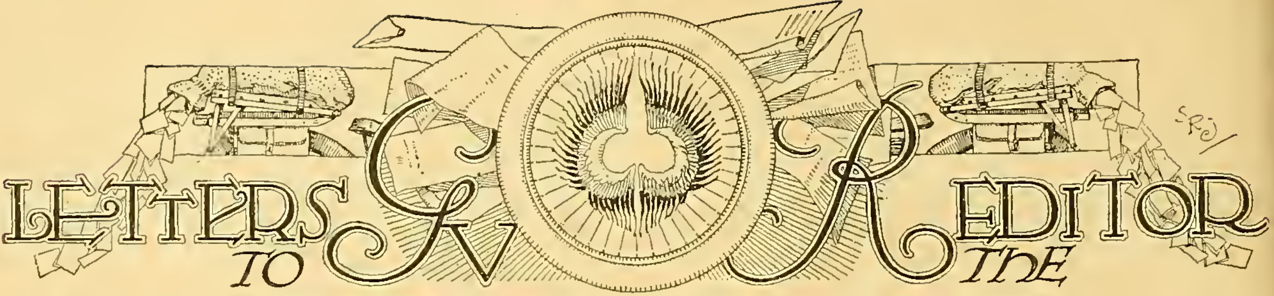
His book is known as "Motors in a Nutshell," and is published at 1s. 6d. by Messrs. E. F. and N. Spon, Ltd., 57, Haymarket, London, S.W.1.

NEW STURMEY-ARCHER TWO-SPEED GEAR.

THE latest production of the Nottingham factory is a young brother of the well-known three-speed gear. It is very similar in details and fittings, but appreciably smaller. Simplicity is its key-note. Gear operations are by two foot levers, giving high, neutral, and low positions. With it is incorporated a cork inset plate clutch, handle-bar controlled, and the usual type of Sturmey-Archer kick-starter. It is now on test by several leading lightweight manufacturers, and should prove as valuable an asset for junior machines as the three-speed gear has proved for the higher powered models. No one will doubt the necessity for a good variable gear on small machines, while the standard three-speed box is on the heavy side.



A Sturmey-Archer gear of new design, having two speeds and clutch. It is intended for use on lightweights.



LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

PETROL WASTE.

Sir,—In your publication of December 27th your correspondent "Economy Officer" evidently does not know what he is talking about when he says, "Incidentally, it may be mentioned that a petrol tin is easily opened without a wire cutter." The petrol tins referred to by "Fair Play" in your issue of November 8th are four-gallon tins (two in a box), soldered top and bottom, with absolutely no opening whatever. I have checked the unloading of thousands.

When the tins are opened at the petrol wharf they are stabbed top and bottom with a kind of dagger.

ONE WHO KNOWS.

TECHNICAL INACCURACY.

Sir,—I do not like to rush into print, but I think I shall not be the only one to protest against the appearance in the premier motor cycling journal of a story called "A Race with Ruin," by Angelina Simpkins. The author may be an expert in the realm of romantic novels, but she would do well in future to steer clear of the pages of a technical journal. Surely Miss Simpkins, however ignorant she may be herself, can find some motor cycling friend to look over her proofs. The tale is a tissue of technical blunders from beginning to end.

I will only quote one statement in support of my remarks: "The bullet struck a sparking plug, and the electricity blew up." Need I say more?

OLD READER.

[We have submitted the above to the author of "A Race with Ruin" who replies as follows.—ED.]

Sir,—I *cannot* understand how people can say such things. "Old Reader" cannot have read many of my works. The ignorance of some people is appalling!

Never in my life have I been attacked for the accuracy of my details. "Old Reader" has not a leg to stand on.

To begin with, I got all the words from a great friend who is in the Flying Corps, and knows *all* about motor cycles. And I have *several* times gone in a sidecar myself. So I should like to ask "Old Reader" if he has ever seen a bullet strike the sparking plug of a hydrostatic turbine? If he has, let him come forward and say what happened. If he has not, how dare he question my conclusions, based on complicated mathematical calculations?

Besides, I am not *Miss* Simpkins at all, and my husband would have something to say, if he were not at the Front—where "Old Reader" perhaps ought to be!

ANGELINA SIMPKINS.

FLYING IN A CURVED PATH.

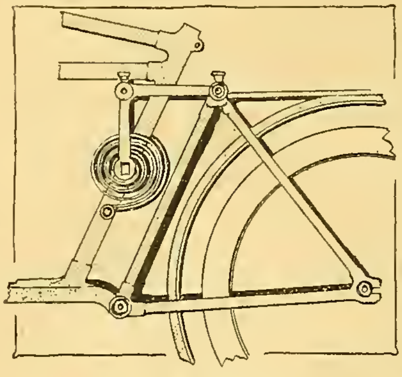
Sir,—I now feel distinctly pleased that I followed my letter of December 6th by a note of retraction, for, by consuming humble pie in this manner, I think I have earned the right to deal exactly as I like with "G.E.H.'s" letter of December 27th. I confess, with sorrow, that, as your correspondent says, much of my letter *was* irrelevant, inasmuch as I could not purge myself of a deplorable spirit of levity that must be wholly abhorrent to a reader of his stern and severely practical temperament. However, I fear that "G.E.H." has rather missed the point of my query. I did not question Mr. Aston's statement, but merely the explanation that was put forward to support it; and it hardly helps me to be informed that the reason *why* an aeroplane requires more power on a curve is that certain specified machines *do* require more power.

Your correspondent asks, "Is 'Dyne' aware that no single force can keep any body travelling in a curved path?" The answer to this question is a most emphatic "No." Because I know of one body—the earth—which is acted on by only one force, the attraction of the sun, and yet this body keeps on steadily lapping round its curved path with undiminished vigour. And there are others. I fancy a great deal of "G.E.H.'s" mystification arises from his failure to distinguish between the forces which propel the body *along* its track and the additional transverse force necessary for converting a rectilinear motion into a curved one. With the first set of forces I was not concerned in the least; my letter dealt solely with the second force, *i.e.*, the force which imparts radial acceleration to the body. In brief, the whole problem is this: An aeroplane requires an additional power output when making a turn, whereas a bicycle or a motor cycle does not. Why is this?

As I have indicated, I believe I am in a position to supply the answer; but, as Mr. Aston will be able to explain the matter much more convincingly and entertainingly than I can, I trust he will find an opportunity of doing so.

DYNE.

REAR SPRINGING.



A suggestion for springing the rear part of a motor cycle frame.

Sir,—I have been much interested in your correspondence *re* rear springing, and cannot resist the temptation of sending you a sketch of what I consider might prove a satisfactory way of solving the problem. Of course, you will recognise it as an attempt to adapt the lever spring principle. I can only say that I never realised what real comfort in a motor car meant until I had these springs put on my old "Merc.," and am longing to obtain something approaching the same luxury on my bicycle.

L.C.E.

PISTON DESIGN IN TWO-STROKE ENGINES.

Sir,—I read with considerable interest an article on the above subject by Mr. James Martin in your issue of December 6th (page 534).

I certainly agree with Mr. Martin's theory that a great deal of piston ring trouble on two-stroke engines would be obviated if the rings were situated in approximately the position shown in his fig. 4.

At the same time, it must be borne in mind that there is a very good reason for the rings to be situated at the top of most two-stroke pistons, viz., in order that the rings may pass the ports at the lowest possible point in the upward stroke, thus forming a gas-tight chamber above the piston, with only the topmost portion of the piston (marked E in fig. 2 of article) above the ports.

In the design shown in Mr. Martin's fig. 4, nearly two-thirds of the piston would have to be above the ports before the part of the cylinder above the piston were gas-tight.

In view of this disadvantage, I do not think Mr. Martin's suggested piston would prove a success.

D. J. McDOUGALL.

GOODS MADE IN GERMANY!

Sir,—I was very much pleased to see a protest in a letter in this weeks Motor Cycle against your paper taking to put Politics in it such as your advert re (Goods made in Germany). now I am a strong believer in always giving honour to where it is due, what ever the make of a article is, and I call the Paris Resolution nothing but one to keep hatred up, and I think a paper like yours which is for sport should keep clear of such, as a sporting paper, and I am not writing this letter just for myself but on behalf of a good few motorists. we are on the same mind as Mr. Ives that if your proprietors keep this up, we shall stop taking the Motor Cycle which we would be sorry to part with as we all are old readers. F. JONES.

[Naturally we do not agree with the views expressed above, but, as we wish to give all sides a fair hearing, we publish our correspondent's letter *exactly* as received.—ED.]

Sir,—I was greatly disgusted to read Mr. C. S. Ives's letter in your issue of the 13th December.

According to his ideas we should welcome the unspeakable Hun with open arms and purses directly peace is declared. I should like Mr. Ives to have been with me recently when I inspected a merchant ship that had been torpedoed without warning. I was shown two caps—all that was found of the two firemen on duty. Are we to forget this sort of thing at once?

Personally I shall never shake hands or do business with a German as long as I live. LESLIE S. BROAD.

Sir,—I heartily endorse the remarks of Mr. Chas. S. Ives in your issue of December 13th, as I also feel that the notice which you print weekly is unworthy of a sporting paper. Are we to allow the present bitterness and the horrors inseparable from all wars to make us forget the part played by the Bosch magneto in the development of the petrol motor? Let us show that we have no eternal quarrel with the Germans, who are the first victims of that Prussianism which now seeks to dominate Europe.

Chelsea. R.O.W.

Sir,—Seeing in your most excellent paper the letter of Mr. Maurice Little sticking up for Mr. Chas. S. Ives, I cannot help writing this letter to express my disgust that any man calling himself an Englishman (perhaps he does not!) should have the face to uphold and encourage German trade in England now or after the war.

Hoping this will find its way to your columns, and so catch the eye of Mr. Maurice Little, and wishing your paper and yourself the best of luck, OLE BILL.

Southampton.

CENTRIFUGAL FORCE.

Sir,—*Re* a letter which appeared in your issue of the 13th ult., under the heading of "Centrifugal Force," "Lieut. R.F.A." apparently sets out to prove that centrifugal force does not act radially. Twice he remarks, "If centrifugal force acted radially." I have always been taught that the force does act radially. If not, how can one account for the tension on a string to which is fastened a body which has circular motion? Surely the force acting as an equal, and opposite, force to the pull on the string is centrifugal force.

"Lieut. R.F.A." also mentions the case of a rider travelling in a straight line, which he counts as an infinite circle, and states that the centrifugal force, if it acted radially, would cause the rider to be immediately thrown over. Assuming the rider travelling in a straight line, and the centrifugal force acting in a direction to his right, then the centre about which he revolves is to his left; but are we not equally entitled to assume the centrifugal force to be acting in a direction to his left, and the centre about which he revolves to be to his right? The two forces would then be equal and opposite, and the rider would not be thrown over. So that certainly will not be sufficient to prove that centrifugal force does not act radially.

Invergordon. SAPPER J.P.D.

Sir,—Your correspondent, "Lieut. R.F.C.," states that what is commonly known as centrifugal force acts tangentially and not radially. May I be allowed to prove the contrary.

Referring to fig. 1, C is the motor cyclist travelling round a curve of radius R at a velocity v f.p.s. His acceleration, as proved in any elementary book on dynamics is $\frac{v^2}{R}$ towards the centre of the curve, and in order to give him this acceleration a force must act in the same direction, and is equal to $\frac{W\,v^2}{g\,R}$, where W is the weight of the machine and rider. This is the centrifugal force. But since to every action there must be an equal and opposite reaction, there must be a force $\frac{W\,v^2}{g\,R}$ acting through the centre of gravity of the machine in the direction C O. This is sometimes known as the centripetal force. So that, in fig. 2, if A G is the motor cyclist and G is his centre of gravity we have a force $P = \frac{W\,v^2}{g\,R}$ acting through G away from the centre of the curve. The centrifugal force is given by the friction of the road Q. Thus, we have a couple tending to turn the machine over outwards, and this must be balanced by another couple of equal moment, which is produced by the weight of the man W acting through G and the vertical component of the reaction of the road, which is also W, acting through A; and in order that this couple may have a moment in the right direction the machine must lean inwards. From this we see that the propelling force does not enter into the question at all, and has nothing to do with centrifugal force as "Lieut. R.F.A." asserts.

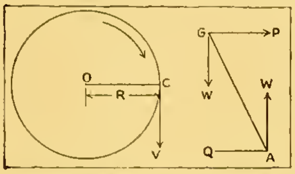


Diagram illustrating centrifugal force.

In the case of a machine travelling in a straight line the centripetal force, and, therefore, the centrifugal force, is $\frac{W\,v^2}{g\,R} = 0$, for R is infinite, if we assume that a straight line is part of the circumference of an infinite circle.

Colchester. E.D.A.

FLYING FACTS AND THEORIES.

Sir,—I need hardly say that the articles which have recently been appearing in your journal from the pen of Mr. W. G. Aston supply a long-felt want, namely, at least an elementary knowledge of the principles of aviation. The ignorance of the man in the street concerning the reasons why aeroplanes fly is not by any means removed by the exaggerated sketches and explanations vouchsafed by the aviation experts of the daily papers, and it is well that a technical journal of proved authority has stepped in to fill the breach.

In your issue of December 6th a letter appears from "Dyne," the argument of which is, to say the least of it, feeble. If "Dyne" had spent as much time in thinking over his point as he seems to have done in elaborating his powers of sarcasm, one can hardly imagine that he would have written as he has done. His point is that the extra power required by an aeroplane when turning to maintain its altitude unchanged is not, as Mr. Aston said, to supply the force which deflects the machine from its straight path, but to overcome the additional head resistance due to the altered disposition of the wings and rudder of the aeroplane. It is doubtful whether a difference exists between Mr. Aston's phrase and that of "Dyne," and, in any case, it is useless to wave "a particularly large and prominently displayed flag of truce" in indicating it. Such a letter only draws attention to the writer's want of knowledge, not only in actual flying, but also in the theory of flight. [See second letter from "Dyne," December 13th.—ED.]

In a letter from Mr. A. E. Brittain, R.F.C., in the same issue, the question of terms again crops up. He says that "a machine must 'meet' the wind to enable it to sustain itself." I agree with him that unless the propeller thrust causes the air to impart a definite amount of positive and negative pressure to the wings the machine cannot maintain a definite altitude, but whether this imparting of pressure by the air is necessarily "meeting the wind" is a matter of a term. We speak of a calm day, and flight is perfectly possible in a calm. What, therefore, does "wind" exactly mean? P. W. F. MILLS, R.N.A.S.

SPONTANEOUS IGNITION.

Sir,—The figures given under the above title in *The Motor Cycle* of December 13th are very interesting, but would perhaps be better understood if some additional data were given. In column 2 it says, "Spontaneous ignition temperature in oxygen." Does this mean that oxygen only was mixed with the fuel to form the explosive mixture? Was any other gas, inert or neutral, present? Also in the experiments what were the actual compressions corresponding to the ignition temperatures given? It is necessary that we should know these things in order to make a proper comparison with what goes on in a motor cycle engine.

The following particulars are taken from a recent publication:

Fuel.	Compression lb. per sq. in.	Initial temperature before compression.	Temperature of ignition.
Petrol ...	90 ...	364° F. ...	986° F.
Alcohol ...	180 ...	373° F. ...	1,292° F.

These figures show the auto-ignition temperature of the mixture as 986° F. They also show that a compression of even 90 lb. per square inch is not permissible if the initial temperature of the mixture before compression exceeds 364° F. This is the reason that in practical motor cycling with an engine which is inherently given to running hot, even when extra precautions for preventing overheating have been taken, the only remedy left is to lower compression.

The temperatures given in the table do not appear to agree exactly with those of "P.J.M."—there may be an adequate explanation of this apparent difference—but they would seem to correspond to the actual temperatures which do obtain in a motor cycle engine.

It is suggested by "P.J.M." that advantage has not been taken of the properties of certain fuels in order to make up substitutes. This may be so in this country probably because the constituents or ingredients have been difficult to obtain since the war, and it is only since the war that the substitute question became acute. The suggested method of mixtures, I think, has been in vogue in America some time. In order to give *good results* it would seem that any mixture of the sort would only have to contain a small proportion of, say, paraffin or similar low temperature ignition stuff. One would gather that the auto-ignition temperature of a mixture is likely to be governed by the ignition temperature of that constituent which by itself has the lowest ignition temperature. If a list of the ignition points of various fuel mixtures could have been included in the table given by "P.J.M." it would have been of very great interest.

Another point is worth considering, and perhaps "P.J.M." or the writer of the article on "The Chemistry of the Internal Combustion Engine" may be able to throw some light on it. In recent times we have heard a good deal of the process of obtaining light hydrocarbons known as "cracking."

In a very hot engine it seems likely that under certain conditions and with certain fuels there is actually a process of dissociation or "cracking" taking place. A light and readily ignited hydrocarbon may be given off and a carbonaceous residue be left. The former would tend to cause pre-ignition, and the latter, by being deposited in the interior of the engine, to augment the danger. May not this be one of the processes by which the phenomenon of "knocking" occurs?

C.R.E.

A SPORTING CHALLENGE.

Sir,—On opening *The Motor Cycle* of November 22nd, the replies of "Despatch Rider" and "D.R.C." to "M.B., Ch.B.," immediately struck my eye. They are interesting and somewhat amusing.

Firstly let me say that I know "M.B., Ch.B.," very well indeed, and if "Despatch Rider" and "D.R.C." knew whom they were criticising they would be more careful. "M.B., Ch.B.'s" old Brooklands Norton, together with another of the same, has many a time had the supreme pleasure of showing a dusty mudguard to sundry 7.9 h.p. twins. "M.B., Ch.B.'s" criticism (admittedly rather harsh) of the W.D. Triumph was based on the machine's behaviour in France. From experience myself out there, I must say the machine in question is reliable and steady, but slow. Many D.R.'s in the Ypres salient will probably remember one "Stiffy" by name. It passed many, was considered very fast, but would not stand up to a long blind, and was prone to the "drying up" fault. By the way, have "Despatch Rider" and "D.R.C." been in France?

Glasgow. "STIFFY'S" MASTER.

Sir,—As a very old reader of your paper I have been very interested in the correspondence *re* "A Sporting Challenge," and especially with Mr. Houlding's letter, with which I thoroughly agree.

I happen to be one of the "boys" he mentions, and I should be delighted to have the opportunity of putting my short-coupled model K Harley against any 8 h.p. 85×85½ side valve J.A.P. as soon as conditions permit.

I, too, have had great experience with W.D. cycles of all makes, and for nearly two years was a tester at the A.S.C. shop you described in your issue of November 22nd.

All I can say of the speed of the W.D. Triumph is that it is a pity some of us cannot meet those riders who get the remarkable speeds mentioned in your columns; then we should either learn something to our advantage or have a good laugh. From my experience of these machines I should say the latter.

No doubt a good many at home think that, because the Triumph is used by the Army in large numbers, it is "it." What is the matter with the military model Norton and other well-known singles, which, given the opportunity, could do all the Triumph has done?

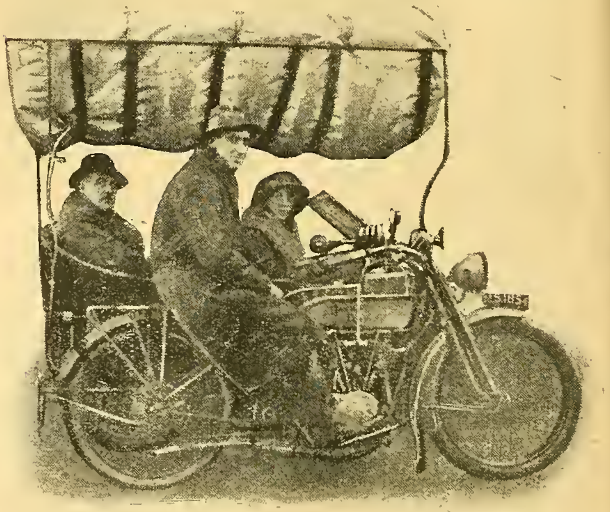
It should be remembered that a good many riders of W.D. machines have had very little experience; in fact, some ought not to be allowed on the road. This the fitters in the shops know to their cost. It is this type of rider who boasts in cafés at night of the speeds he has done, but who, when asked to come out and show what he can do, generally makes excuses about his tyres, etc. This sort of thing does not help to get the perfect motor cycle, and that is what we want.

S. A. MARKS.

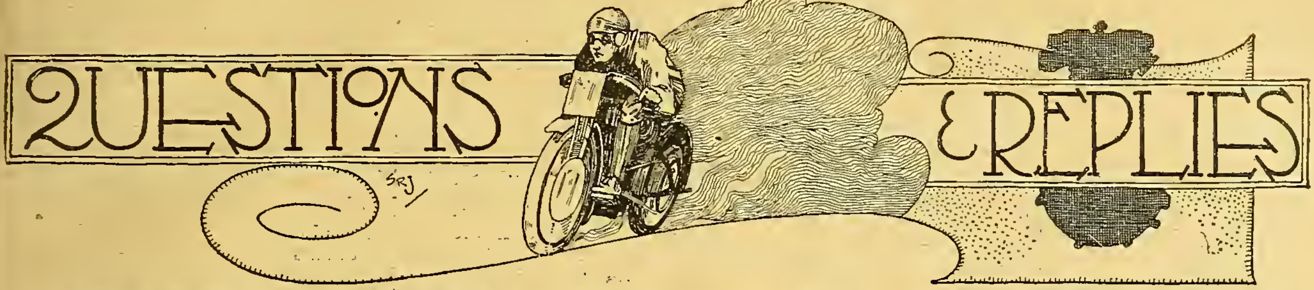
RUNNING ON COAL GAS.

Sir,—I am forwarding a photograph which, I think, will interest you. The machine is a 1915 Harley-Davidson with a 1917 Phœnix double-seated sidecar. The gasbag was made by Barton Bros., and holds approximately fifty-five cubic feet at .2 lb. pressure, which on ordinary roads carries me fully fourteen miles. The bag is supported by a light metal frame slung on cabinetmakers' straps. The closer you get the gas connection to the cylinders the better, as I tried several experiments of putting the gas in through the automatic air intake and also through the hot air intake, but the results were very indifferent. In this instance I was carrying 34 stone, and could surmount without difficulty anything but a freak hill.

JAS. A. TAIT.



A gasbag fitted to a 1915 Harley-Davidson. This holder contains sufficient gas to run fourteen miles.



QUESTIONS & REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

The Lubrication of Chains.

What is the best thing to do with chain transmission having the rear chain exposed? Some people advocate leaving the chain dry, and say that greasing the chain only picks up the dust and grit; but others are all for lubrication. Personally, I find if the chain is greased it requires far more attention than otherwise, but would like to know which treatment is the best.—A.G.C.

After washing thoroughly in paraffin soak the chain in hot blacklead and tallow, heated over a dull fire, then hang up to drain while still hot. A dressing of this sort will last several hundred miles. It is a good plain always to keep the chain dry, never applying thin oil, which merely collects grit, which wears the sprockets and the rollers, and is flung off on to rider and machine.

Magneto Trouble.

I have a 3½ h.p. motor cycle, which I have just overhauled. To test the spark, I fixed a handle on the pulley nut of the engine, and by turning the engine, say, about 30 r.p.m., I got a good spark with the lever advanced, but when I retard the ignition I get no spark at this speed. Would you be kind enough to tell me if there is any fault in the magneto?—C.Y.

We do not think that the magneto is necessarily at fault. The number of revolutions is comparatively low, and probably if you can obtain a speed of, say, 200 or 300 r.p.m. you will find that the magneto will give quite a satisfactory spark with the lever retarded, provided the contact breaker mechanism is not unduly worn, thus causing erratic breaking of the points at the fully retarded position.

The Use of Petrol.

(1.) I have a little petrol. Am I allowed to ride my motor cycle to the station (two miles), using that petrol? I have no petrol licence. (2.) I have a two-stroke fitted with petroil lubrication. I wish to run it on gas. How can I manage about the lubrication? (3.) Will it hurt the engine if I run it with a slightly loose gudgeon pin?—R.H.R.

(1.) If the petrol you have by you was purchased under a motor spirit licence, you may use that petrol for the purposes mentioned in the Motor Spirit Restriction Order, which appeared in *The Motor Cycle* of October 18th. You may use the machine for going to a station if there is no other means of conveyance. (2.) You would have to have a separate drip feed arrangement to bring the oil into the inlet pipe or into the crank case. (3.) It is not advisable to run with a loose gudgeon pin. This should be seen to at the earliest posible moment, though it is not so likely to injure your two-stroke engine as the same defect would be to injure a four-stroke.

Running a Stationary Engine.

I have great difficulty in starting on heavy fuel an old motor cycle engine which runs my workshop. Will you therefore please tell me: (1.) Whether I can obtain without licence or restriction some fuel on which the engine will start easily? (2.) If not, can I obtain an easy start on, say, paraffin? (3.) Is there any likelihood of obtaining a petrol licence for about half or one gallon per month for the above purpose? (4.) As a last resource, how would a small tank do to hold about four cubic feet of gas at four atmospheres for starting? Would it contain enough coal gas for one start and warm the engine up enough to run on neat paraffin?—W.H.L.

(1-3.) As the engine is to be used for stationary purposes in connection with, we presume, some industry, we think you might be quite well allotted a small supply of petrol if you make application to the Petrol Controller's Department, 19, Berkeley Street, London, W.1. We know of no other fuel which you could conveniently use, except coal gas. If this is available it should do quite well. You might try the effect of pouring boiling water over the induction pipe when trying to start on paraffin. (4.) If you have gas laid on there would be no need to fit the tank you have designed, as it could be coupled up direct from the gas pipe to the engine. Provided you get the right mixture (about seven parts air to one of gas) you should start without difficulty. If you cannot get gas laid on, the small pressure tank would do what you require.

In submitting to the Editor articles, photographs, or drawings, contributors are asked to mention whether the illustrations are exclusive, and further to enclose a stamped addressed envelope for return of unaccepted contributions.

A Leaky Oil Release.

Will you kindly give me your advice upon the following point: I have an old type 2½ h.p. engine, and having dismantled it I found that a cork was inserted in the crank case compression release. The cork completely blocked the passage round the central pipe, leaving only the pipe open communicating with the crank case. Should the passage be free? How is this type of release supposed to act? It has always sprayed oil very liberally over my right boot. What can you suggest to stop this, as the outside of the crank case soon gets smothered with oil from the release?—E.T.

We should not think that the cork in question did any harm. It was probably inserted to prevent an excessive amount of oil being blown out of the crank case. The working of the device is exceedingly simple. What happens is that when there is compression in the crank case the air is allowed to escape through the valve, thus creating a partial vacuum during the ascending stroke of the piston. The best way to stop the oil reaching your boot is to fit a long pipe to the exit so that the oil is conducted clear away. Evidently the former owner's attempt to stop the leakage of oil was not successful.

Repairing a Small Hole in the Cylinder.

The cylinder of my B.S.A. machine has developed a very tiny hole. The hole is so small that it does not interfere enough with the compression to prevent my using the machine. My trouble is an oily cylinder. In looking through past numbers of *The Motor Cycle* I find that iron cement is recommended for such trouble. I have asked at different motor cycle shops, and no one has heard of the cement. Will you be so kind as to inform me if it will meet my requirements, and where it can be bought?—E.H.

We should hardly recommend iron cement for a repair of this kind, but should advise you to plug the hole, say, with a brass pin, and see that it is quite smooth inside. Iron cement can be obtained from most leading accessory dealers, such as Brown Bros., Ltd., 15, Newman Street, Oxford Street, W.1; G. T. Riches and Co., Ltd., 19, Store Street, Tottenham Court Road, W.C.2; H. Taylor and Co., Ltd., 21a, Store Street, Tottenham Court Road, W.C.2; R. Melhuish, Fetter Lane; or Geo. Adams, High Holborn.

Local Taxation Licence Exemption.

The Petrol Committee is now issuing petrol licences for trade purposes only. I am the holder of one of these, and use my motor cycle for trade only. Can I run it without sidecar, etc., without taking out a £1 licence? I have read in your columns that it can be done if a sidecar is attached.—F.J.D.

Unfortunately, the authorities will not recognise a solo machine as one which can be exempt from the local taxation licence, as it is not a vehicle constructed and adapted solely for the conveyance of goods and merchandise.

Curious Magneto Trouble.

A magneto on a friend's machine gave out. A new condenser was fitted and a good spark obtained. It sparked well when fitted until the chain was connected to the engine, whereupon no spark could be obtained. On taking the chain off the engine sprocket and still leaving it on magneto sprocket, and turning magneto, with chain held in one's fingers, the spark again occurred, but on recoupling to engine it disappeared. We have not been able to get to the bottom of the trouble, and should be glad of your expert opinion.—R.J.R.

From the symptoms you describe we should imagine that the spindle flange is loose, or the bearings worn, and, consequently, when the chain is fitted to both engine and magneto spocket the pull is sufficient to draw the armature into contact with the magnets. Make sure that the magneto is not rusty inside.

Fitting a New Piston.

I have recently had my 5-6 h.p. Rudge cylinder refitted with a new piston. The firm which did the work were asked by me when I sent my cylinder and piston ring and gudgeon pin to return the Rudge piston, ring, and gudgeon pin as I was only sending them for a pattern. Instead of fitting a Rudge pattern piston, etc., they fitted a two-ring piston with solid gudgeon pin, which is half a pound heavier than the old one. Also, the gudgeon pin in the piston they sent was too large in diameter to go into the small end of the connecting rod of the engine when the rollers are in place. (1.) Apart from the misfit of the gudgeon pin, would the half-pound extra weight upset the balance of the engine? (2.) Is it bad practice to protect the ends of gudgeon pin with brass discs? The gudgeon pin is a driving fit. (3.) Is $\frac{1}{32}$in. play too much for a new piston? (4.) Would two rings double the friction between the piston and cylinder compared with the Rudge single ring piston?—A.H.B.

(1.) The extra weight would upset the balance of the engine rather considerably, but the flywheels might be rebalanced. (2.) No; this is quite a common practice, and is satisfactory. (3.) One-thirty-second of an inch play is too much. The clearance should not exceed $\frac{3}{1000}$in. at the base. (4.) Two rings would not cause much extra friction, and the addition need not be taken into account.

Knocking.

I have a 1916 7-9 h.p. twin which has a bad knock. It sounds as if there were play on a small end or a slack gudgeon pin. The engine was taken down and cleaned, and the connecting rod bearings were all in good condition and the gudgeon pins all right. On putting the engine together again I find the knock is still there. It occurs either on the level or uphill until the engine has reached about half speed on all gears, and then the noise deadens the knock. I am running on half naphtha and half petrol, with a Binks carburetter and hot air intake. There are no air leaks, and it does not seem to be an ignition knock. There is a small crack in the exhaust valve seat of the front cylinder, which evidently causes the valve to overheat. Do you think this might be the cause of the knock?—J.M.S.

The noise is possibly what is known as "piston tap," which cannot be eradicated in engines of certain design, or it may be merely the clatter of the valves or a tappet that requires adjustment. The crack in the exhaust valve seating should be welded, but would not cause this defect.

Engine Racing.

(1.) I have a $3\frac{1}{2}$ h.p. 1917 Rudge-Multi which ran quite well until a few weeks ago. The engine now races madly as soon as the throttle is opened to any extent. Having tightened the clutch, I found a decided improvement when the machine was running, but it is not to my satisfaction. When the engine is running free it seems to do three or four (probably more) revs. per second more than it used to. When the throttle is fully opened the engine turns over so rapidly that it makes me feel nervous. Starting is very hard (almost impossible) until a pumpful of petrol has been injected into the sparking plug holes. When once warm starting is quite easy. The engine also gets over-heated, and knocks when turning corners. The compression is good. (2.) What is a two-stroke? (3.) Is my machine a two-stroke? (4.) Am I likely to get into trouble if I take the machine out to get it into running order? I wish to join a volunteer corps, but cannot do this unless I know that my machine is in good trim.—E.W.B.

(1.) The symptoms described seem to indicate that the engine is running on too weak a mixture. This would account for the difficult starting and for the fact that the engine knocks when trying to pick up. Are you sure that there is not an excess of carbon deposit? Possibly a slightly larger jet would be of assistance to you. Make sure that all the carburetter joints are drawn tightly up, permitting no air leak. (2.) A two-stroke engine is an engine that has a firing stroke every two strokes, *i.e.*, every revolution: see "Motor Cycles and How to Manage Them," obtainable from these offices, price 1s. 10d. post free. (3.) Your machine is a four-stroke. (4.) We do not think so. It all depends upon the view taken of the matter by the local police.

Making an Oiltight Joint.

I have lately dismantled my $2\frac{3}{4}$ h.p. 1913 Ilkston engine for a general inspection and overhaul. (1.) I am rather uncertain as to the best solution with which to make a good crank case joint. Would you advise seccotine or gold size? (2.) Also would you kindly tell me how much oil to put in the crank case before starting up? I should think about a teacupful, but would be glad to have your opinion. (3.) Should I pack the crank case ball bearings with grease or would oil be thick enough, and would you advise a small quantity of graphite if I use grease?—H.G.P.

(1.) Seccotine would make a good joint, as also would fish glue, but a well-fitting joint should not need any external treatment; it should be quite oil-tight. (2.) About three pumpfuls, which should be equivalent to the contents of a small teacup. (3.) You need not pack the ball bearings with grease—sufficient oil will reach them from the engine. On no account use graphite with ball or roller bearings.

The Carriage of Motor Cycles by Rail.

I have bought and paid for an A.J.S. and sidecar. It is at Reading. The vendor informs me that it is not now permissible for it to be sent per passenger train as such goods are not being accepted. Is his statement correct concerning passenger train traffic? I belong to the local motor volunteers, and am very much handicapped by the non-delivery of the machine. The only solution I can think of is to go myself to Reading and ride back. The objection to this is that it would take two days, which I cannot spare. I suggested to the vendor he should meet me, say, half-way, so that I could do the return journey in one day, but he is debarred from riding by the petrol regulations. Can you give any suggestion as to how I may get the machine?—C.F.R.

We have consulted with the Railway Clearing House on the matter, and they inform us that they are unaware of any such regulation, except that motor cycles would not be carried between December 17th and December 28th. What has probably happened at Reading is that there is a great congestion of goods to be carried at the present time on the railway, and the machine has to await its turn. An alternative would be for you to write to the vendor and suggest that he should obtain a permit from the Petrol Controller's Department, 19, Berkeley Street, London, W.1, to deliver the machine, and should then meet you half-way.

RECOMMENDED ROUTES.

COVENTRY TO ABERYSTWYTH.—E.S.

Coventry, Stonebridge, Coleshill, Weeford, Gailey, Weston, Crackleybank, Shrewsbury, Westburn, Newtown, Machynlleth, Aberystwyth. Approximately 145 miles.

LINCOLN TO MANCHESTER.—H.M.

Lincoln, Saxilby, Dunham, W. Drayton, East Retford, Worksop, Chesterfield, Baslow, Chapel-en-le-Frith, Stockport, Manchester.

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are the most reliable in the world is supplied by the fact that by far the greater number of machines in use by our Dispatch Riders at the Front are C.A.V. equipped

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BEING wholly engaged upon production for the British and Allied Governments, we regret that we are unable for the present to execute any orders for private purposes.

Victoria Road, Willesden Junction, N.W.10.

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Smart, yet Practical, and Perfectly Waterproof.

PLANNED on the saddle, so to speak, these garments combine smartness with perfect ease and freedom.
Built of Paramatta Twill of the finest proofing, they are quite impenetrable to wind and rain.
They are guaranteed absolutely waterproof, and the quality is unequalled anywhere for the price.

Jacket with Belt - £2 10 0
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Dunhills, Ltd.,

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359-361, Euston Road, N.W.

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Glasgow:
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MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns—First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. Spares: prompt delivery.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

A.J.S., 6h.p., and sidecar, one of the last 1915 models turned out; price only 75 gns.—Julians, 84, Broad St., Reading. 'Phone: 1024. [0931

A.J.S. Motor Cycles.—Immediate delivery of the very latest 6h.p. models from stock.—The A.J.S. Specialists, The Walsall Garage, Walsall. Tel.: 444. [X9872

A.J.S., 4h.p., late 1915, renovated December, 1917, by A.J.S., at cost of £30, perfect condition, Mills-Fulford sidecar, all fittings; offers.—Captain, 99, Kedleston Rd., Derby. [X0248

A.J.S. Motor Cycles; immediate delivery of special 1917 model, complete, detachable wheels, 700×80 tyres; £91/6.—P. J. Evans, 87-91, John Bright St. Sole agent for Birmingham and district. [2352

A.J.S. 1916 6h.p. De Luxe Combination, hood, screen, spare wheel, 95 gns.; A.J.S. 1916 4h.p. combination, Gloria sidecar, screen, spare wheel, 79 gns.—Rider Troward and Co., 31 and 78, High St., Hampstead. (D) [2442

PLEASE Note, we can deliver the latest 6h.p. A.J.S. model from stock, price £91/16; also several other new machines from stock; please send for our lists.—The North Wales Motor Exchange, Chester St., Wrexham. [X9884

FORWARD

That name is full of meaning when applied to fasteners.

Above all it means a longer and more certain servicer.

And the reason is to be found in its simple and clever construction, its Roller Bearings and exceptionally strong Steel Links.

These features are a positive insurance against a failing service and you can "bank" on the Forward to never "let you down."

Ask us, for fuller details of this and other models.

FORWARD MOTOR Co.,
Forward Works. Summer Row,
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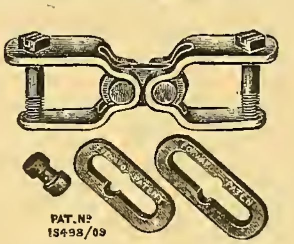
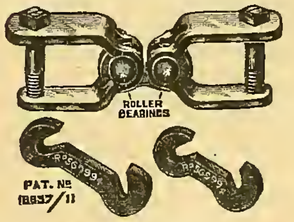


The Forward, 1/6.



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Post Free,
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For Injecting Grease and Heavy Oil into Gear Cases, Hubs, etc. A most useful article for all speed merchants.
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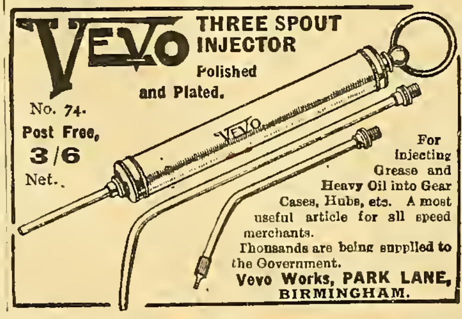

DEFENCE OF THE REALM ACT

Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

Alldays.

ALLDAYS Allon 1917 2-stroke Motor Cycle, like new throughout; bargain, £24.—Page Bros., 162, Acre Lane, Brixton, S.W. [2497

ALLDAYS Matchless, late 1915, 4h.p., 3-speed and clutch, kick start, coach sidecar, all accessories, etc.; any trial; £36, or offer; good lightweight part.—C.S., 497, Old Ford Rd., Bow. [2439

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-speed countershaft models in stock. [1048

Auto-Wheels.

AUTO-WHEEL, only run 70 miles, £10/10; another, good order, £6.—Proctor, Wendover, Bucks. [2425

Bradbury.

3h.p. Bradbury, Simms-Bosch, B. and B., good tyres and belt, perfect working order; £8.—Hanson, Rehoboth, Spring Terrace, Rawtenstall. [X0145

Brown.

BROWN, 3½h.p., mag. ignition, low built, engine lately overhauled, splendid order throughout; bargain, £12/12.—Box L5,317, c/o *The Motor Cycle*. [2514

B.S.A.

B.S.A., 1916, 4¼h.p., 3-speed, chain-cum-belt, C.B. sidecar; great bargain, 45 gns.—12, Crosby Terrace, Long Lane, East Finchley. [2501

1915 B.S.A. Model K, Canoelet sidecar, large P. and H. lamp, sidecar lamp, Lucas horn; £50.—Walbro Cycle Co., Saffron Walden. [X0151

GENUINE Bargain.—1914 B.S.A. countershaft combination, fully equipped, excellent condition; 39 gns.—Kington, 223b, Hammersmith Rd., London, W. [2485

B.S.A., 4¼h.p., 3-speed, special sidecar, hood, screen, etc., brand new, 87 gns.; 1913 B.S.A., 2-speed, clutch, 27 gns.—Rider Troward and Co., 31 and 78, High St., Hampstead. (D) [2455

1917 B.S.A. Model K, large Canoelet sidecar, luggage grid, disc wheel, apron, very large P. and H. lamp, very large twist horn, rear lamp, sidecar lamp, and generator; £60.—Walbro Cycle Co., Saffron Walden. [X0149

1916 B.S.A. Model K, with large Canoelet sidecar with apron, P. and H. lamp, rear lamp, and £1/1 Lucas horn, and £5/5 Smith speedometer, just like a new machine; £55.—Walbro Cycle Co., Saffron Walden. [X0150

BIGGEST Bargain This Week.—B.S.A., 1916, 4¼ h.p. coachbuilt combination, 3 speeds, clutch, K. starter, chain-cum-belt, absolutely as new in every way; £45; call or write quickly.—3, The Mews, Victoria Rd., Clapham, S.W. [2494

4¼h.p. B.S.A., chain-cum-belt, and B.S.A. coachbuilt sidecar, Lucas lamps, Cowey speedometer, mechanical horn, only ridden a few miles, and as new throughout; £75.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0552

Campion.

CAMPION, 2-stroke, late 1914, little used; £15.—Brett Bros., Wisbech Fen, Wisbech. [X0155

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AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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The Fuel Question.

IT is perhaps dwelling on the obvious to inform our readers that the one supreme interest for all motorists at the present time is any measure that will tend to promise alleviation or amelioration of the fuel situation. The formation of the new Central Council (with which we have already dealt) will have this dealing with the fuel question as one of its main agenda. Our sister journal *The Autocar* in its issue of December 8th, 1917, dealt very ably with one or two aspects of the fuel question as it stands at present under the heading "The First Thing First." *The Autocar* suggested, and undoubtedly rightly so, that the fuel question is the burning question of the day, and must be dealt with and mastered before motorists or motorists' representatives spend their energy and time in other directions. There is, of course, one aspect of the fuel question that is fairly obvious when any thought is given to the question, but it is astonishing how few motorists appear to have realised it, and this is the question of the benzole supply after the war. We all know, or should know, that the output of benzole after the war will be considerably greater than that before the war. On the other hand, it is equally well known that the consumption of motor fuel after the war will be enormously greater than it was before, and that the increased output of benzole will make practically no difference to the situation as far as benzole's meeting the country's fuel demands is concerned. There is, however, one matter in which benzole may perform a very valuable service, and that is in helping, to a certain extent, to keep down the market price of all fuels.

What is expected in many quarters is that after the war certain gas companies will put their superfluous benzole on the market at, say, 1s. 6d. per gallon. If this takes place one of two things is bound to happen; either the whole available supply will be immediately consumed so that the general body of private motorists will receive no benefit (obviously the first supplies will go to commercial users) or, alternatively, the petrol ring will lower the price of their fuel until benzole is driven off the market. When the rival has been finally dispensed with, the petrol companies will once more have a free hand, and will again be able to force up their prices in the way we have so recently experienced. The remedy suggested for these two catastrophes is the formation of a benzole ring, *i.e.*, a kind of ring of gas companies willing to place their benzole on the market after the war. The object of this ring would be two-fold, to prevent benzole from falling under the control of the petrol ring, and to maintain a fixed price of all such benzole as may be turned out.

The launching of benzole on the market on any considerable scale will be an entirely new enterprise, and it is only natural that the gas companies will want some guarantee that the enterprise is likely to be a paying concern, and as far as can be seen at present the only way this can be guaranteed to them is that they should have an assured market and an assured price. Suppose for the sake of argument the gas companies are promised 2s. per gallon for benzole, and not only promised this price but promised a certain consumption per annum. If this consumption is satisfactory the gas companies will jump at the chance of getting rid of their valuable by-product in this way. The step that will be taken by the petrol ring to meet this will most probably be, as we have already suggested, a lowering in the price of their fuel. Now if motorists turn to petrol because it is temporarily cheaper, the aim of the petrol ring will be achieved.

What is most essential is that those who undertake to buy benzole in the quantity and at the price specified must also give an undertaking that they will not be seduced from their agreement by any lowering in the price of petrol. In other words, they must promise not to be led astray by the seductions of the petrol ring.

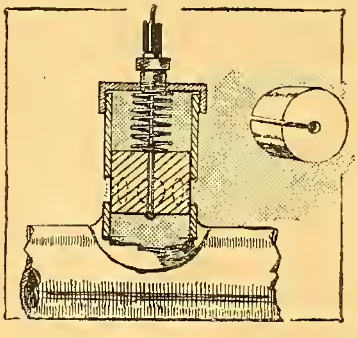
An index to the advertisements in this issue will be found on the page facing the back cover.

IDEAS: Useful and Ingenious.

MAKING AN EXTRA AIR INLET.

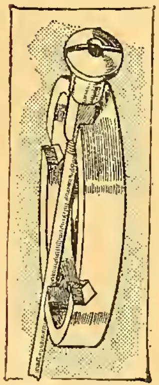
IN this time of economy it is possible to build a very efficient and cheap air valve. Take an old brass cycle pump, saw it at about the centre of the screwed cap, make a little round collar to fit the induction pipe. Drill a large hole in the pipe, and three or four little holes in the pump tube. The diameter of the holes cannot be stated, and depends on the carburetter naturally. After the holes are drilled the valve body is soldered on the pipe, this requiring abundant heat on account of the mass of metal.

Then take a small piece of round cast aluminium or copper to fit the inside of the tube. With a saw cut it to allow a cable to be inserted in the middle, a spring is added, the cap is screwed, and the throttle is operated by Bowden control or by a screwed rod and wing nut.


An extra air intake made from part of an old cycle pump.

To prevent the throttle turning it is possible to solder a little copper pin in the valve body, which will act as a guide where the throttle has been sawn.

The whole can be plated, and will save many shillings in petrol.—Y.Q., Rouen.

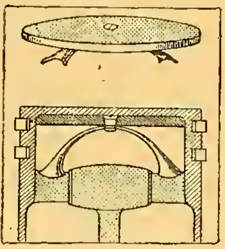

A nipple key made from a worn bracket disc.

MAKING NIPPLE KEYS.

USEFUL nipple keys can be made out of worn bracket discs to suit any size of nipples. The discs, of course, must be heated and softened to allow them to be filed and sawn. The sketch clearly shows how the bracket should be filed to allow the nipples to fit the slots.—Y.Q., Rouen.

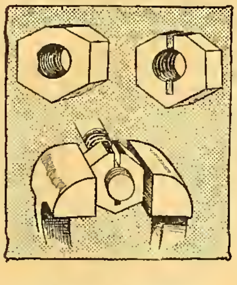
INSULATING THE PISTON HEAD.

A SIMPLE method of insulating the hot underside of the piston head from oil has occurred to me. It consists in obtaining a circular piece of sheet asbestos, about ⅛in. thick, having its diameter the same as that of the interior of the piston. This is held against the top of the piston by a spring whose crown is fixed to the centre of the disc, and whose extremities rest upon the bosses of the gudgeon pin. The resistance of the spring would hold the asbestos firmly against the piston, effectually preventing oil from coming into contact with it.—DENNIS F. WELCH, Oxford.


An idea for insulating the piston head.

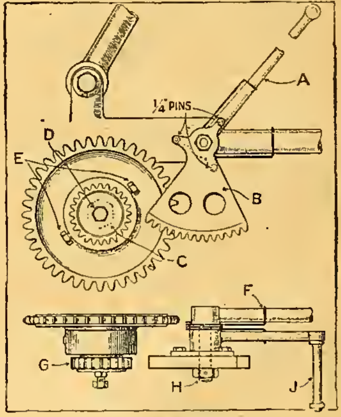
HOLDING A THREADED ROD IN THE VICE.

IT is often found to be necessary to hold a rod the end of which is threaded, such as a brake control rod, in a vice. The ordinary lead pads are good enough, but if the rod requires to have any turning pressure exerted upon it, it will be found that the lead will not hold the work sufficiently tightly, and if excessive pressure on the vice is exerted it will be cut through, and the threads on the rod will become eventually damaged. The alternative is to get a nut which fits the rod and file off one corner quite flat. In the centre of the flat make a nick with a file, and then with a hacksaw cut the nut practically in two. The split nut can now be slipped over the threads, and if the jaws of the vice are screwed up it will be found that the work is securely and sufficiently held.—*L'Automobile aux Armées.*


Securing a threaded rod in a vice.

HOME-MADE KICK-STARTER.

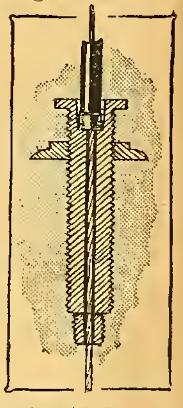
THINKING others may be interested in the home-made kick starter I have devised, which answers admirably, I give the following details. A is a crank, once on a push cycle, with driving wheel removed and pedal J reversed. The crank is secured to the quadrant B by means of three ¼in. pins. A shaft H has taken the place of the original one, which secures the back stays to the frame, but made a little longer to carry the crank and quadrant, which gear with G, which is affixed to the chain sprocket of the two-speed gear. Inside G are three pawls, which act as a free wheel, to enable the quadrant to return to its original position for starting, one kick being sufficient to give the engine two complete revs. A washer C keeps the free wheel on, and also the pawls in position. The ¼in. set pins E prevent the clutch spring inspection cap from unscrewing. A spring F with three coils of ⅛in. wire returns the crank and quadrant to the starting position.—H.G.B., Tibberton.

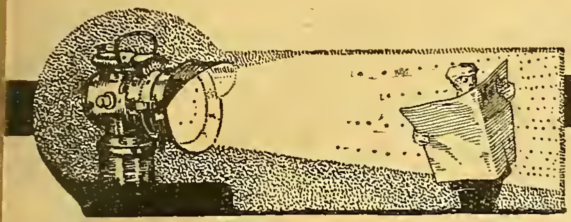


A home-made kick-starter.

IMPROVED BRAKE FITMENT.

VERY often use can be made of an old French cycle tyre valve instead of the ordinary too short thimbles for the brake fittings, the removal of the obturator being the only alteration required.—Y.Q., Rouen.


An old French tyre valve as a brake fitment.



Occasional Comments

By Ixion

A Taste of Old Times.

WHAT little motoring I get nowadays is mostly accomplished in a big car with a slouch-hatted damozel at the helm: but Christmas week brought a delicious reminder of days past, and days soon (I hope) to return. I got out on the moors with my old A.B.C., and a tankful of petrol. The last time I saw G. E. Bradshaw, the A.B.C. designer, he was quite out of conceit with the 1914 model, and if he condescended to talk two-wheelers at all, was full of hints about something quite different and entirely revolutionary. But all I can say is that, if he has something better than the 1914 marque up his sleeve, it will be very, very good. After chugging about on the slow speed, partially sprung, hard service W.D. type of jigger, a few miles of open road on a fully-insulated mile-a-minute mount was a treat to be remembered. The heavy machine began to bark under the merest paddle-off, revved till I trembled for its bearings, ate up hills as if they were not there, and slid over the war-hammered highways as if they were asphalt drives along a sea front. Some bicycle, the double-sprung A.B.C. I had forgotten how extraordinarily good it is: and I ruthlessly turned down three more applications to purchase it at a tempting price.

Experimental Aero Engines.

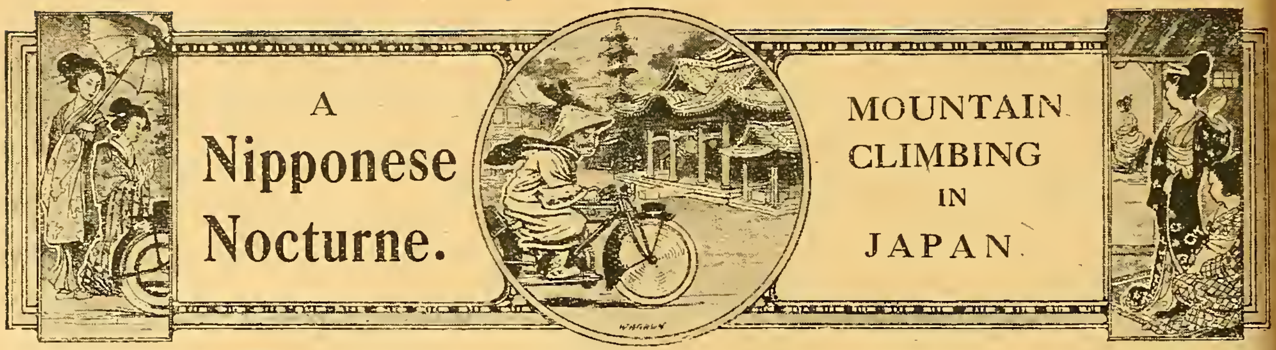
I HAVE not the pleasure of Mr. Philbrow's acquaintance, and in noticing his letter of complaint that the R.F.C. authorities are unsympathetic towards inventors, I am merely treating his grievance as typical of many similar letters to the press, without reference to the merits of any particular case. I personally believe, and many people more qualified to express opinions agree with me, that our own engine experts have erred in the other direction. So far as engines shot down up to date afford a basis for judgment, the German authorities have absolutely barred out every original and unorthodox engine. They have limited themselves since August, 1914, to the conventional products of half a dozen of their best factories, and have concentrated their production almost exclusively on the six-cylinder vertical aero engine. Our own departments, on the other hand, have encouraged a weird variety of designs and designers: in many cases, wholly experimental engines have been financed by the Government. No nation has shown a greater readiness to listen to untried men, and to give untried notions of apparent promise a fair trial. Designs like Mr. Philbrow's, and those of other naturally mortified inventors, who have published similar complaints, enter into competition with other secret designs, and are judged by the best experts in the country. The names of the staff concerned, both as regards production and technics, include many engineers who have "made good" in the industry, and other engineers whose reputation is rather scientific than commercial. An individual engineer, in his pardonable and natural disappointment, is always ignorant of two vital factors. He does not know what rival designs have been given the preference over his: if he could see the drawings accepted at the very session where his own scheme was turned down, he might not agree with the decision, but he would at least admit that the experts had a plausible case. Secondly, he cannot give full value to the question of production. Under the stress of war conditions, it is not a matter of securing the engine which will give the last ounce of efficiency per c.c.: it is more often a question of which design can be produced in hundreds most rapidly and most easily, with the materials and labour at our disposal. I happen to know a little more than Mr. Philbrow does of these matters, through my touch with the trade: and I, personally, have considerable confidence in the designs department of our air organisation. If I wanted to criticise them, I should take the diametrically opposite line: and say that we should be in a stronger aerial position if we had dallied less with the untried inventor, and concentrated more along Hun lines upon quantity production of tried and conventional designs. This, as regards the past. So far as the present and future are concerned, I hope we are very close to the happy mean.

Dangerous Ground?

SIMILARLY, L.-Cpl. Reeve is theoretically on dangerous ground when he asserts, as against Mr. Aston, that the seven-cylinder rotary is necessarily obsolete. Rotary engine design has turned largely on the crux of efficient cooling. The difficulty of obtaining perfect air-cooling with large cylinders certainly caused a wide adoption of nine smaller cylinders as opposed to seven larger cylinders: and so far L.-Cpl. Reeve is right. But from what leading designers have stated and prophesied about air-cooling of late, some going so far as to vouch for its ultimate adoption on most motor cars in the future, these difficulties are not theoretically insoluble. The decision between a seven and nine-cylinder rotary would then depend upon other factors, one of which would unquestionably be ease and cheapness of production. The seven-cylinder, which our correspondent stigmatises as "obsolete," might then knock the nine-cylinder out of the field.

Auto-wheelist to the Rescue.

A CORRESPONDENT asserts that local repairers have failed to diagnose a fault in his B.S.A. Auto-wheel, and as my own experience of this handy little mount is strictly limited, I publish his case, in the hope that some owner of a sister machine may be able to play the Good Samaritan. The machine behaves ideally on generous throttle openings, but occasionally when it is throttled down the engine utters a sharp staccato crack, like a stick breaking, and drags for a moment.



A Nipponese Nocturne.

MOUNTAIN CLIMBING IN JAPAN.

It was just after tiffin, and the Knut was leaning moodily against the Club door-post when Oilrags walked up, digging within the bowl of an evil-smelling pipe of undoubted antiquity.

"What a life!" groaned the Knut.

"Yes," assented Oilrags; "and this pipe is a baby two-stroke for carbon."

"Try paying a decent price for your 'bacca," returned the Knut. "Anyhow, what about a stunt this week-end?"

"I'm game," said Oilrags. "Where to?"

"I've heard you bragging a lot about some fearful pass that you climbed, or rather pushed your old 2½ h.p. 'bus over in the dim, distant days, before I came out to this blues-inducing, benighted island," chaffed the Knut. "Let's have a shot at it, and I'll show you how it should be climbed."

"It is a bit late to start now," said Oilrags, dubiously. "If the road surface is good we may get over before dark, but if it is bad we shall be nicely in the cart."

"I don't care a rap," snorted the Knut. "I'm fed up with mooning about here. A bit of a thin time will give us something to grouse about. I'm desperate."

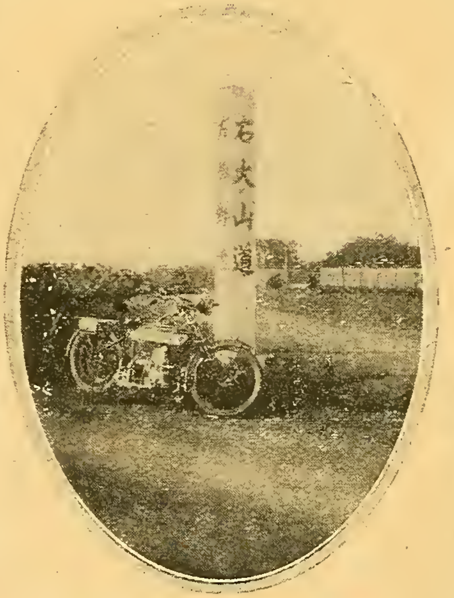
"What's a' this aboot bein' desperate?" enquired the Wee Yin, sauntering up. "Ah'm gey desperate masell'. Bran' noo belt; cost me twal plunks (plunks = slang for one yen, about 2s. 1d.) an' it's cut like the de'il on a wee bit sharp edge o' ma beltguarrd."

"Never mind, Wee Yin," said Oilrags, soothingly. "Only twenty-eight days in this month. Anyhow, would you care to come on a mountain-climbing stunt? Mighty good chance of being stuck in the dark. Shocking bad road, and as steep as the price of spares in Japan?"

"Ah'm jeck easy," replied the Wee Yin, phlegmatically. "Starting now?"

"Yes," replied Oilrags. "Bring some grub, because we shall have to stay overnight on the other side of the pass—if we get over."

"Cheerful blighter," remarked the Knut, as the trio moved off to haul their respective mounts from their sheds. At 2 p.m. the other members of the mess, whilst sleeping off their midday meal, were aroused to violent vituperation by the combined exhausts of a 2¾ h.p. V twin bestridden by the Wee Yin, a 3½ h.p. single (minus silencer) ridden by the Knut, and a 3½ h.p. flat twin driven hard on low gear with malice aforethought by Oilrags.



The author's flat twin Brough beside a quaint-looking Japanese signpost.

The Start—and some Packhorses.

All went well with the trio for awhile. They streaked past the Oyama signpost at a brisk pace, endeavouring to make fast time over the good road to the village of Sekimoto, ten miles distant, where begins the ascent of the Ashigara-toge Pass. When about six miles out, however, the Knut's machine petered out. The Wee Yin was well ahead, but Oilrags, who was in the rear, stopped to assist the Knut. After a few unsuccessful running attempts to get going, the Knut jacked up his mount, and investigated the cause of the stop. A choked jet was diagnosed. It was soon cleared, and the Knut moved noisily off again. Getting towards the hills, packhorses of an excitable nature caused several delays, and Oilrags raised a laugh by unintentionally scaring a wobbling Japanese rider of a pedal cycle into a rice field—an almost dry one, fortunately for the native.

The Wee Yin was overtaken whilst gazing thoughtfully at a trembling packhorse's heels. The horse was standing across the narrow road, and the driver was evidently inviting the Wee Yin to pass between the animal's hind quarters and the road's edge.

"Does the muckle idiot," wrathfully exclaimed the Wee Yin, "expect me to risk ma gude machine anent yon cuddie's heels? Micht as weel hond him ower two months' pay, and ha done wi' it."

After a brief parley the packhorse was led fearfully past the stationary machines, and the motor cyclists continued their journey.

From Sekimoto the climb proper commenced. The grade was easy at first, but the surface was atrocious. Storm water gulleys traversed the road at all angles, and at intervals crude little wooden bridges spanned numerous small streams. Each bridge stood 6in. or so higher than the road at the abutments, consequently crank case bumping was rife. Oilrags, whose machine had a very small ground clearance, had to lift his 280 lb. of iron at almost every bridge.

Nipponese Nocturne.—

After a couple of miles of this work, with a few lditional halts to allow badly scared packhorses to led off the road, the trio of trouble seekers were ell amongst the hills. As the higher levels were ached the grade became steeper and steeper and the irpin bends increasingly acute. The road surface ried from loose sand and gulleys to what the Wee in called "currant bun road," *i.e.*, a surface studded ith projecting boulders.

Many were the involuntary halts, the runs round ose hairpins, and the narrowly verted spills. The Knut's clutch as out of commission, so that lmost every time he stopped his ompanions had to assist him with push off. The Wee Yin's light achine danced like an agonised og over the "currant bun" retches, and Oilrags crept autiously upwards, making much se of his h.b.c. in his endeavours avert the many inevitable colsions between his crank case and e "currants."

Night came on, and the Wee Yin, ho possessed no lamp, and had nce or twice all but gone over the dge of the road, where a long drop nto the valley awaited him, cried Enough." The Knut half greed, for he had put in a lot of trenuous push-starting; but Oilags, who had done quite well in the ay of avoiding crank case colisions for the last mile or so, was or keeping on. He let in his lutch for a fresh start, and had ravelled but a few yards when his ngine raced furiously. Frantic anipulation of clutch and gear levers made no difference. Something had gone, so he altered his mind, nd also cried, "Let's quit." The travellers were ut a quarter of a mile from the summit of the pass 2,500 feet above sea level), but the last few hairpins vere terrifying. Steep, loose, and acute; it was not vise to attempt them in the dark.

The machines were pushed to the side of the road, hich had narrowed down to a width of about 4ft., nd Oilrags then discovered that his belt fastener had roken.

ON THE ASHIGARA-TOGE.

The road surface varied from loose sand and gulleys to what Wee Yin called "currant bun road"—*i.e.*, a surface studded with projecting boulders.

Taking the Knut's lamp, the trio left the motor cycles and started away to walk the six miles over mountain footpaths into Suruga town. It was an eerie walk, for in places the light of the Knut's acetylene lamp, when directed over the cliff's edge, failed to reveal anything but space, and a slight mist tended to obscure the faintly marked foot track.

After an hour or so of walking the lights of Suruga became visible down in the deep valley of the Sagami river, and the travellers were soon installed in an inferior Japanese inn.

Next morning a return was made to the summit of the pass, whence a comprehensive view could be had of the pass winding and twisting away down the mountain side; but the dull weather made photography impossible.

Descending to the spot where the climb had been abandoned on the previous day, the disappointed trio found their motor cycles covered with dew, but untouched; for nobody, except perhaps a few native woodcutters, use this pass as a rule.

Snow was falling and a bitter wind swept the hill tops when Oilrags set to work upon his broken belt fastener and his companions began coaxing their gummy engines into life.

Loud and echoing maledictions from Oilrags upon some person or persons unknown startled the other two blue-fingered motor cyclists. It appeared that the spare belt fastener that Oilrags always carried was missing. Of course, neither the Wee Yin nor the Knut had a spare.

Oilrags started to lace the belt with a spare length of Bowden wire, whilst the heat of his annoyance and subsequent utterances increased in inverse ratio to the temperature of his numbed fingers. However, it was a strong-looking job when it was finished, and the trio began the descent of the pass.

Except for an occasional slide on the muddy patches caused by the melting snow, nothing untoward happened to the thwarted trio as they journeyed homewards; but all three were inwardly resolving to do no more "absurd stunts."

* * *

CARBIDE FOR DOCTORS.

DOCTORS who use motor cycles in their practice in carrying out night journeys have found great difficulty in obtaining calcium carbide owing to its prohibited sale, whilst electric lighting outfits cannot be purchased, and a satisfactory oil lamp for use on a motor cycle is difficult to obtain. Lucky are the few who possess machines fitted with self-contained electric installations, thus rendering them free from all irksome restrictions, for to many the carbide difficulty has proved a very real one of late. This being the case the Auto Cycle Union has offered to investigate and report upon applications from medical practitioners for calcium carbide for lighting the lamps of their motor cycles when on professional journeys at night time.

The Ministry of Munitions has expressed its thanks for this offer, and has announced that such applications for a permit under Paragraph 4 of the Order of 24th September, 1917, will receive consideration within the limits of the supply of carbide available.

Doctors should therefore make application to the secretary, Auto Cycle Union, 83, Pall Mall, S.W.1, for a form on which to apply for a permit to purchase.

MILITARY NOTES

The Oldest Despatch Rider: Another Cyclist's Exploit: Recent Honours.

A MOTOR CYCLIST'S EXPLOIT.

IN the wonderful attack by the Italians on the occasion of their recapture of Mount Asolone, a motor cyclist officer signally distinguished himself. The chief brunt of attack was borne by the Cuneo Brigade and the 240th Regiment of the Line, whose Colonel, when all communications had been destroyed by the enemy's fire, himself worked a heliograph when the light permitted. North-west of Asolone, where the troops held gallantly to their original line on a plateau despite all assaults, a young staff officer went along the line encouraging the men and carrying orders on a motor cycle, which in some extraordinary way he managed to keep upright, bounding over ground where there was no road and dodging between trees, all the time under fire.

* * *

A REAL SKY PILOT.

THE central figure in the accompanying photograph is Lt. R. M. Bankes-Jones, R.F.C., who was in the Church prior to the war. Shortly after hostilities broke out he took up a post, as announced in these pages, as an Army chaplain, and after having served two years Overseas he resigned his chaplain's commission and was recommissioned into the R.F.C. He succeeded in getting his wings five months ago.

Pilots of the R.F.C. Reading from left: Lt. Anderson, Lt. R. M. Bankes-Jones, and Lt. Mooney.

In a letter to us he says: "It would be very interesting to know how many of the fellows who used to compete in the English and Scottish Six Days Trials have since become R.F.C. or R.N.A.S. pilots. I believe motor cycling is a good preparation for air work. The two other parsons who have joined the R.F.C. are B. H. Davies and P. Bischoff, and we all three rode in the 1914 Scottish Trials."

* * *

FOR VALUABLE SERVICES.

IT is with great pleasure that we note that Col. F. Lindsay Lloyd has received the Order of C.M.G. "in recognition of valuable services in connection with the war." Col. Lloyd is, of course, well-known to our readers as having been clerk of the course of the Brooklands Automobile Racing Club and chairman of the British Motor Cycle Racing Club. His work in connection with automobiles and motor cycles as regards the Army during the past fifteen years has merited the fullest recognition on the part of a grateful country.

Among the promotions which have been given to officers for valuable services rendered we note the name of J. Forgan Potts, R.N.A.S., who has been promoted from Flight-lieutenant to Flight-commander. Before the war he was a private owner racing motor cyclist.

* * *

DEATH OF A MOTOR CYCLIST SOLDIER.

WE greatly regret to have to announce the death of Lt. W. Howard, R.G.A., the only son of Mr. and Mrs. Howard, of Walton-on-Thames, who died of wounds shortly before he would have celebrated his fourth Christmas in France. He had been out at the Front since Mons, and before the war was a pupil with Messrs. H. Collier and Sons, Ltd., Plumstead, the manufacturers of the Matchless motor bicycle.

His ambition in life was to be a motor cycle racing man, and prior to the war he was already beginning to shine conspicuously in competitions, notably in the B.M.R.C. meeting of June 19th, 1913, where he finished fourth in the 1,000 c.c. handicap race, riding a 5 h.p. Matchless, and in the kilometre and mile speed trials on September 18th of the same year, in which, on his 5 h.p. Matchless, he covered the kilometre and mile at a speed of 68.44 miles an hour.

RECENT HONOURS.

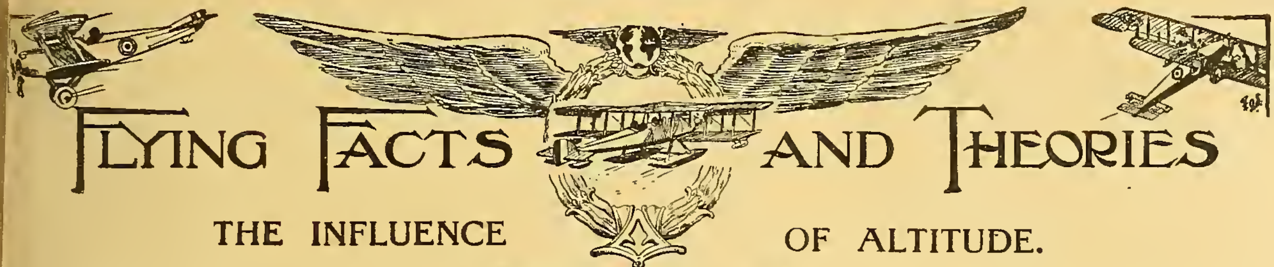
IN the *Gazette* we notice the names of the following well-known motor cyclists mentioned in despatches: Temp. Capt. E. A. Colliver, the rider of an Indian, and a partner in the firm of Godfreys (Great Portland Street, London, W.); Temp. Capt. C. T. Newsome, the well-known Rover exponent; Temp. Sec.-Lt. J. T. Van Hooydonk, an old-time motor cyclist; and Temp. Capt. G. J. W. Gatehouse, who before the war was an enthusiastic motor cyclist.

* * *

THE OLDEST DESPATCH RIDER.

CPL. R. SOMERSET, writing from Mesopotamia, says: "I have seen in recent issues of *The Motor Cycle* a discussion as to who was the youngest despatch rider on foreign service. It caused a good deal of interest among them. Now I should like to ask who is the oldest D.R.? My age is forty-eight years, and I have been on active service three years with the Lahore Division, Signal Company. One year was spent in France and two in Mesopotamia. I enclose my photograph, which was taken in the winter in Mesopotamia."

Cpl. R. Somerset, D.R., whose age is 48 years. He asks, "Who is the oldest despatch rider?"



FLYING FACTS AND THEORIES

THE INFLUENCE OF ALTITUDE.

By W. G. ASTON, A.M.I.A.E.

IN discussing the performance of various aeroplanes, particularly in regard to their climbing abilities, I have recently been rather struck with the fact that most people are lamentably ignorant of the effects which height above the ground has upon the flying capabilities of a machine. Ever since the earliest days the altitude to which aeroplanes have attained has steadily increased, the best effort up to date being somewhat about five miles, or roughly equal to the height of Mount Everest, not neglecting the meticulous two feet which ultra-scholarly geographies are in the habit of adding to its recognised 29,000.

Now, the height to which an aeroplane can climb is not dependent, as many seem to think, upon the breathing capabilities of the pilot: indeed, nowadays no pilot would think of attacking an altitude record without a self-contained oxygen apparatus, and probably some warming contrivance as well; it depends, other things being equal, upon the weight per horsepower of the machine, and, as this is a definite ratio, so there is a definite limit to the height to which it can soar. This is very neatly called the "ceiling" of the aeroplane, and such "ceiling" is an important characteristic, which is to be considered in relation to the machine's maximum and minimum ground speeds and rate of climb generally, in order to arrive at its all-round performance.

Atmospheric Density.

The higher one goes above the surface of the earth the less is the density of the atmosphere owing to the effect of gravity upon its particles, that is to say, the weight of each layer is taken by the layer immediately below it, hence those at the bottom are more compressed than those at the top, where the air is comparatively rarefied. For the purpose of measuring heights on an aeroplane an aneroid barometer is employed. This instrument, however, does not show altitude accurately, since it merely indicates atmospheric density; corrections must therefore be made in order to accommodate the varying factors introduced by temperature, humidity, etc., at ground level; even then the record of the barometer is not perfectly accurate, though it is sufficiently so for all practical purposes.

Varying atmospheric density has several important primary effects upon an aeroplane. First of all, it alters the resistance both of the planes and of the body. (These two, as we shall see later, require separate consideration.) Next, it alters the explosive mixture delivered to the engine, as well as the degree of completeness with which the cylinders are filled. Again, since it affects resistance, it also influences the working of the air screw, and, for the same reason, it makes a difference to the reading of the air-speed indicator. In the case of water-cooled engines it alters the temperature at which the water boils. All these effects are felt not only by aeroplanes, but by other machines. For instance, motor cars when taken to high altitudes not only boil their water much more readily, but give less power, besides requiring adjustments to the carburetter.

In order to get an idea of the combined effect which these influences produce, we will briefly consider the principal ones separately, but it must first be pointed out that this is purely an elementary consideration in which only the more prominent points are discussed; it makes no pretensions to discussing all the conditions concerned.

The Resistance of the Wings.

One cannot deal with the resistance, or drag, of the machine as a whole because it is made up of two parts, that which is produced by the lifting elements, and is consequently subject to variation according to the angle of incidence, and that which is due to the body, framework, tail, engine, etc., and may be regarded as the same throughout the range of angles of incidence which are likely to be employed. The latter is called body-drag and the former wing-drag.

The upward thrust, or lift, which is furnished by the planes of a machine, depends upon the weight of air which they accelerate downwards. If, therefore, both the speed of the machine and the angle of incidence of the wings remain constant, the *volume* of air deflected will also remain constant, and this means that the lift will decrease as the machine gets higher, since the weight or density of air is inversely proportional to the height. To counteract this decrease in lift it is necessary to increase the angle of incidence so that a greater volume of air is dealt with. If the ratio of lift-drag were the same for all angles of incidence it would follow that, provided the same degree of lifting effect were obtained by altering the angle of incidence at various heights, the resistance would also be constant. As a matter of fact, the lift-drag ratio does alter with the angle of the wings, but this alteration is not very big through the range of angle called for, consequently we can look upon the wing resistance as being practically unaffected by height. It is interesting to note, in passing, that although there is a general tendency for the lift-drag ratio to decrease as the angle of incidence is increased, exactly the reverse effect takes place below a certain small angle. Hence it may happen that if an aeroplane is designed so that the wings are at a very small angle when flying level just above the ground, the wing drag can actually get slightly less as the angle of incidence is increased with an increase of altitude, but it will get greater again after a certain point is attained. For

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the purposes of the present article, however, we will neglect this effect and consider that the wing-drag remains constant at all altitudes for a constant speed. This is not quite the truth, but it is not very far away from it.

Body Resistance.

The drag of the machine other than that of the wings can be regarded as, roughly, independent of the angle of incidence, provided the altitude is unchanged. Such drag is, however, dependent upon, and directly proportional to, the density of the medium through which the machine moves. As this density gets less with increasing height it follows that the body drag will also get less as greater and greater altitudes are attained.

Total Resistance of the Aeroplane.

Since one part of the aeroplane's resistance is unaffected by height and the other decreases with increasing height, it follows that the total resistance takes a mean between the two, and also decreases with increasing height, though not to the same extent as does the body-drag. Given a constant thrust, therefore, the higher a machine goes the faster it will fly. In other words, for a constant speed it will have less resistance.

It is important to note that the necessity for increasing the wing angle with increase of height is subject to the aeroplane speed remaining constant. The required constant lift can be furnished by meeting the decrease of air density by an increase in speed. If the power of the engine were not affected by height, but remained at all altitudes the same as on the ground, then the angle of incidence would be also kept the same, and the speed would be increased in inverse proportion to the density.

Engine Power.

Unfortunately, petrol engines of the present accepted type do not give the same power at different heights, but their output falls off as more and more altitude is attained. The power a petrol engine gives is dependent upon the weight of fuel which can be completely burnt in the air contained in the cylinder. If the density of the air falls off, then the weight of fuel introduced must also be diminished. If not, and the supply of fuel is kept the same as at ground level, then as the altitude is increased the mixture will grow more and more rich. To counteract this a hand controlled mechanism is generally incorporated in the carburetter by which the strength of the mixture can be regulated in accordance with requirements.

This alteration of mixture strength is, therefore, a matter of small importance compared with the fact that the explosive charge in the cylinder will decrease in weight as the altitude is increased. Consequently the power will fall off, and it will do so, provided its revolutions are unchanged, at a rate approximately proportional to the density of the air. Taking the normal density of air at ground level at 100, the following scale gives roughly the density at various heights:

1,000ft.	96.4	10,000ft.	69.0
2,000ft.	92.5	15,000ft.	57.4
5,000ft.	83.0	20,000ft.	47.8
8,000ft.	74 5		

On the basis of these figures, an engine at 20,000 feet will only give at constant r.p.m. about half its power at ground level.

Leaving aside for the moment the question of air-screw efficiency, we have, then, the following conditions. The resistance of the aeroplane falls off less rapidly than the density, whilst the power of the engine, which, of course, should be directly proportional to the resistance, falls off more quickly than the resistance. As a result, it is unavoidable that as it increases in height the aeroplane should go slower, as it is only by this means that it can fly with less power.

The Ceiling.

It is clear, therefore, that at a certain point the two factors will become equal, and then no further altitude can be attained. It is this point which is called the "ceiling" of the machine, and it is hastened by the fact that beyond a certain point an increase in angle of incidence will impose a disproportionate drag.

One cannot, however, simply plot curves for these two factors and take their meeting point as the "ceiling," as certain secondary matters have to be taken into consideration.

When the aeroplane goes slower the engine will also go slower (as explained in a previous article). Hence its power will suffer a decrease in addition to that imposed by the reduced air density. Since as a general rule engine power is proportional to revolutions, we may take engine power, in this case, to tend to be proportional to aeroplane speed. This reduction in power, of course, will cause the aeroplane to travel more slowly, unless its effect can be neutralised by having a change-speed gear or variable pitch air-screw, by means of which the engine revolutions can be kept up.

Another result of reduced aeroplane speed is a decrease in air-screw efficiency, by reason of the angle of attack of the blades growing larger; thus there is still another agency working against the speed of the machine. Hence the "ceiling" will occur at a lower height than might seem to be dictated by first considerations.

Variable Pitch Air-screw.

There are two obvious ways of overcoming, or at any rate lessening, these difficulties. One is to use an engine of ordinary type of such excessive power at ground level that, in spite of the calls made upon it, there is still ample at great heights. This has the disadvantage that at low altitudes the engine if fully opened out might rack itself to pieces, as it would then overpower the screw, though this objection could be met by controlling the throttle with a baro-stat, which would automatically limit the throttle opening at all heights. The other method is to use an engine of a type in which the power output does *not* fall off in proportion to the density, and it is in this respect, needless to say, that the greatest development is to be looked for. A variable pitch air-screw would also be valuable in connection with such an engine.

If constant power for a given number of revolutions but irrespective of height is available, then the aeroplane resistance will decrease, since the same angle of incidence can be employed. In this case the speed will have to be increased, and with it the revolutions

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of the engine. Since resistance is proportional to the square of the aeroplane speed multiplied by the density, it is obvious that in these conditions the speed of the aeroplane at various heights will be inversely proportional to the square root of the density. Thus, referring to the table given above, the speed at 15,000 feet will be roughly 25% more than at ground level, and the revolutions of the engine will also be 25% higher. This in turn means that the power of the engine will increase by an equal fraction. If the revolutions are kept to a constant figure the aeroplane speed at 15,000 will be about 12% higher than at ground level.

Air Screw.—If the speed of the aeroplane is kept constant and the engine revolutions also, then the efficiency of the air screw will remain exactly as it is on the ground, since this efficiency depends—as will be shown in a subsequent article—upon its advance per revolution.

Air Speed Indicator.—This instrument employs the principle of atmospheric pressure, and as this depends upon the density multiplied by the square of the speed, the reading of the dial will be proportional to the square root of the density. At 15,000 feet it will read 75 m.p.h., whereas the real speed of the machine will be 100 m.p.h.

The Need for High Flying.

The question will most likely be asked, "Why should we want to fly at all at such great heights, when much smaller altitudes are sufficient for getting from place to place?" The answer is that for war purposes the ability to get to a great height quickly is of very great importance, whereas in peace times the upper air will be sought on account of its comparative steadiness both in flow and direction, and its freedom from gusts. "The trade winds" of which the aeroplane of the future will take advantage are at a very great altitude.

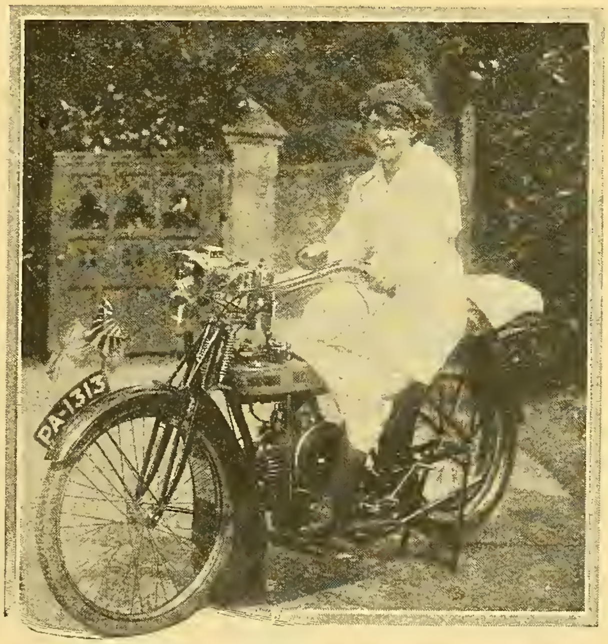
NAPHTHALENE AS A MOTOR FUEL.

A New Departure involving the Use of a Solid Fuel.

THE fuel question is ever with us, and we are of opinion that it is one that cannot be dealt with too fully or too often. Every discussion, even if in itself not likely to bear fruit, is always pregnant with possibilities, and may lead to something of almost revolutionary importance. One of the latest steps in this direction is the suggestion of using a solid fuel in motor cars, and if it can be used in cars there is no doubt that it can with a little adaptation be applied to motor cycles. The fuel in question is naphthalene, which has long been on the market as a dope for petrol under various weird and wonderful names. The various dopes that have been put on the market have ultimately all been proved to be of little real value, but no one has ever doubted the fuel value of naphthalene itself if applied in a proper manner. It is one thing to use a substance directly as a fuel and another to use it as a dope for another fuel; just as while coal is an excellent heater for a boiler, no one would dream of putting coal into a paraffin burner intended to heat a boiler. Naphthalene is never likely to replace petrol or even coal gas, because the output is relatively limited, and if extensively used as fuel the price will rise. At the present time its price is equivalent to petrol at between 6d. and 7d. per gallon.

Briefly, the system of using naphthalene is to fit to the engine a kind of box, or, if you like to call it so, a carburetter, filled with solid naphthalene, which substance is heated and melted by the engine. Once melted the fuel is maintained in a liquid state by the continuous application of exhaust heat, and is vaporised after the ordinary principles of the old surface petrol carburetter. Of course, there are considerable difficulties in the way of maintaining an efficient temperature, the circumstances being very similar to those obtaining in the use of paraffin, but the difficulties are considerably magnified because the solid naphthalene obviously requires a far higher temperature to convert it into a perfect gas than does liquid paraffin; a temperature of something in the neighbourhood of 500° F. being suggested as most suitable.

Another suggested use of naphthalene is as a carburating agent for coal gas. Some of our readers will doubtless remember the old Albo-carbon gas system, in which an ordinary gas flame was enriched in its light-giving properties by the fitting of a bulb half filled with naphthalene that was heated by the flame, and when heated carburated the coal gas, so increasing the light given without increasing the consumption of gas. As far as we are aware the use of this solid fuel on a motor car is at present in a purely experimental stage, and it is doubtful whether it will ever alleviate the fuel shortage which exists, and which is likely to exist for some time.



Miss Mabel Hickman, a munition worker who uses her Douglas for journeying to and from work. The front mudguard has been drilled; this is found beneficial in helping to cool the front cylinder.

THROUGH RUSSIA, TURKEY AND ROUMANIA

The author held up by a camel transport in Armenia.

Incidents of a Great Ride through the Caucasian Mountains into Asia by an Old Competition Rider—Lt. W. H. Bedford, R.N.V.R.

ALTHOUGH for the last two years my chief duties have been that of Technical Repairs Officer with the British Armoured Car Squadrons, which you know have done such magnificent work in Russia, Armenia, Turkey, Roumania, and Galicia, I have always taken a keen interest in motor cycling during all the above campaigns.

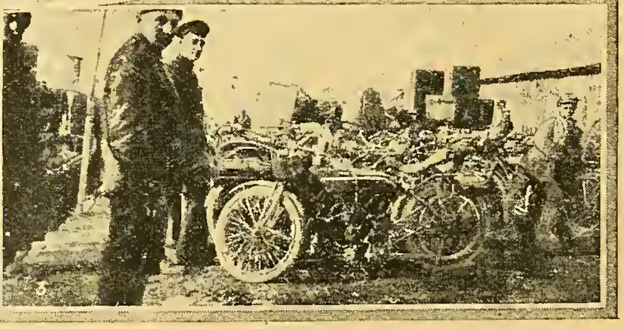
Many readers of *The Motor Cycle* will remember me as a keen competitor in open trials on Hazlewood and Rex-Jap motor cycles. Those days were indeed happy, but my ride over the Caucasian Mountains, through Armenia into Turkey in Asia, proved one of the most strenuous rides it has ever been my lot to undertake, but I am sure many would have welcomed the experience. I think I can claim to be the first British motor cyclist to undertake the journey.

I chose my mount very carefully, and as I anticipated extremely bad roads, dangerous bends, and hair-raising mountains to ascend and descend, a light machine appealed to me, so I decided on a 2¾ h.p. Douglas, to which I fitted a two-gallon petrol tank, as fresh supplies were impossible for hundreds of miles.

Starting the journey at five in the morning, I made good progress over that wonderful Georgian road. On arriving at Mount Kasbeck the dust made it very difficult to steer a straight course, but my machine was light, and I am fairly long-legged, so I prevented many a spill by using my feet. Some miles further on I reached the mountains of Passanor, where progress was slow owing to numbers of slow-moving oxen transport bound for the Erzerum Front. At times it was difficult to pass these vehicles, the roads being narrow with-

(1) A typical wayside coaching station on the Georgian Road nearing Tiflis.

(2) A general view of the mountain roads which wind across the pass.



(3) British and Russian motor cyclists ready to embark.

Through Russia, Turkey, and Roumania.—

out any parapet at the side, and being cut round the mountain side. To misjudge one's distance by a few feet would result in fatal disaster, as one would roll down a precipice of many hundreds of feet in some cases. At mid-day I thought of the sandwiches in my pocket; but alas! they were hard and uneatable owing to the excessive heat, so I had to go hungry—but only for a short time. Later watersplashes were troublesome, but proved a refreshing bath. The Georgian road was good (for Russia), and at last the end came on arriving at Tiflis. Then followed another 250 miles through Besarabia and Armenia in Turkey in Asia.

Twenty-nine Hairpin Bends on One Hill.

For scores of miles there were no roads at all, and the roads that were made were too bad for me to try and describe—my description at the time was "climbing stairs with motor cycles," and a very true one too. Some hills had many hairpin bends, some were particularly dangerous, and one hill, or rather mountain, had twenty-nine hairpin bends; all these could be taken quite well with my Douglas (although later it proved that even our Rolls-Royce cars had to reverse to navigate them successfully), but a good speed had to be maintained, for once stopped on a mountain pass it was impossible to restart, even with such a light machine. The dust at times was up to my flywheel, and brought the machine to a complete standstill. The whole ride proved exceedingly interesting, as the road conditions were quite new to me, also the country—which I can best describe as just "Biblical." The different races of people, who were practically uncivilised, would only stare with wide-open mouths at my motor cycle.

Broken Frames.

Later many of our despatch riders rode over the same course: how rude were my remarks when I counted the number of broken frames that came into my workshop for repairs—not due to bad riding or faulty workmanship, but just to "impossible" roads, which made one think so much of England with its glorious motor ways. For a whole day it was not possible to travel over fifteen miles per hour, and many sore limbs were observed. Commandments as well as machines were broken; but we did the journey for a good cause, and not a sound or grumble was heard when our first shots were fired at the enemy on this Front.

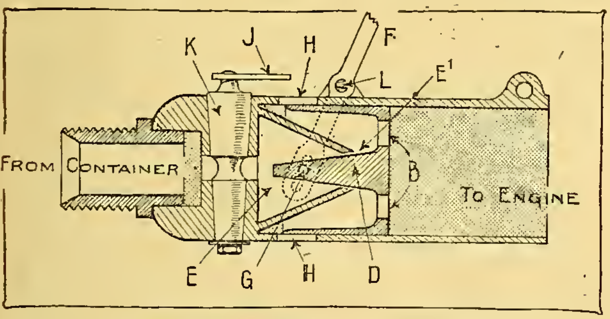
The journey was done in August, 1916, and since then I have encountered many interesting experiences on other fronts.

A COAL GAS CARBURETTER.

The P.S.C. Carburetter, from which the Inventor has obtained Excellent Results.

We have now reached that stage in the use of coal gas for motor traction purposes where we may turn our attention to the consideration of improvements in method. Up till now we have been so concerned with any methods of using the new fuel that we have had little time to consider the best way of achieving this end, and it marks an important step in progress when our deliberations are enabled to take this new turn.

The first endeavour is to obtain improved results from our present type of engines. The chief aim is to guard against waste of gas; the second the method of supply. I have designed a carburetter which would cost very little to manufacture, and could be used with compressed or atmospheric pressure gas. The sketch will give an idea of the principle. The throttle valve has a tapered needle D fitted to the centre B, the ports in the throttle valve, through which the gas passes to engine. G is a pin screwed into the throttle valve, which works in the slot on the control lever F, which rocks on pin L. When the control lever L is brought back it takes the throttle valve forward, opening the air ports H, at the same time opening the gas ports E at point E1 (the air ports H should be relative to the opening of gas ports E1). The air ports, being behind the gas port, give better results, and would curtail the waste of gas. When the throttle is closed it shuts off the supply of gas. We come now to the advantage of the supply cock K with the operating lever J. The gas port E must be large enough for the supply of gas at atmospheric pressure. Should compressed gas be used, the flow of gas can be controlled by regulating the supply through the supply cock K. One must take into account if compressed cylinders are used that the pressure of gas decreases as the gas is used. The supply cock is for that purpose, and can be regulated according to the reading of the gauge. Practically an even supply down to atmospheric pressure could be obtained; the positions would be found by experiment. The throttle could be operated by Bowden control (this would dispense with lever F) and a small lug cast on the side of the body with adjusting screw-fitted nipple on the end of the wire with a hole in to fit on the pin G. A spring could be used in various positions in connection with this method.



Carburetter designed for use with coal gas.

If we are going to have facilities for the supply of coal gas after the war, in compressed cylinders (and there is no reason why we should not), it would do no harm to turn our attention to a double purpose carburetter which could be used either for petrol or coal gas.

G. R. Player, A.M.I.A.E.

WIRING AN ACCUMULATOR LIGHTING SET.

A Selection of Letters from Readers setting forth Various Solutions to the Wiring Problem advanced by "Chinook."

To the Editor of "The Motor Cycle."

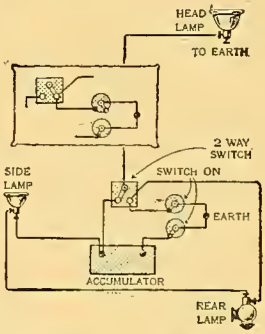
Sir,—My thanks are due to your many readers who have been so good as to write you or me personally *re* the problem of wiring three lamps, two of which are "earthed" to the frame (the third, the sidecar lamp, being mounted on the sidecar body, and therefore insulated) in such a way that all three can be thrown into series, thus consuming a minimum of current from the accumulator when the machine is left standing at the roadside. Such a generous response is really refreshing, and the variety of schemes set forward, each differing from the rest widely or in some detail, is a good illustration of the convenient adaptability of electricity as a lighting medium.

CHINOOK.

[We append, in an abridged form, a selection of the ideas received, and regret that, owing to restricted space, we have had to withhold a large number of interesting suggestions.—Ed.]

Mr. F. Reynolds: "I venture to send a sketch showing one way of doing what 'Chinook' desires, which may be of some use to him and others.

"It will be necessary to insulate the tail lamp from the machine as well as the side lamp, but this can easily be done with the aid of a little insulating material, such as red fibre inserted between the clips holding the lamp bracket to the frame of the machine. A two-way switch will also be required in addition to an extra tumbler switch of the usual pattern.

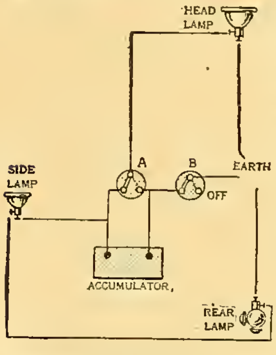


"The diagram gives the position of the switches when the side lamp and tail lamp are in series, and the head lamp in direct circuit with the accumulator. The inset shows the position of the switches for all three lamps in series.

"It will be seen that whichever system is in use at the time the original switch as fitted to 'Chinook's' machine will control all the lights, and no 'short' can take place by wrongly manipulating the switches."

Mr. A. Watson: "In answer to 'Chinook's' request for a method of connecting up his three lamps in series at will, this can be done in a few minutes by the addition of a two-way switch without any extra wire, or at most only a few inches.

"Call the full line position of each switch 1 and the dotted line position No. 2, then we get with: A1 B1=full lights (side and tail in series). A1 B2=no lights. A2 B2=dim lights (all in series). A2 B1=side and tail lights only.

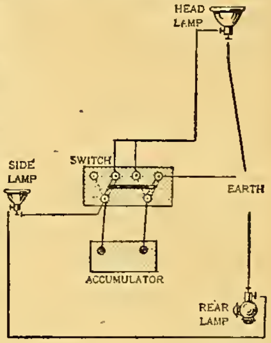


"The operation of the switches would be simplified if they were coupled together. Then, if they were wired correctly, we should get only positions 1 and 3. Position 4 is not required, and position 2 can be obtained by switching off the head light, or any of the three lamps by its own lampholder switch.

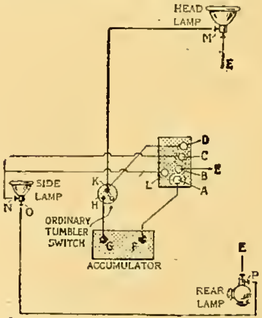
"This may seem rather complicated on paper, but in reality it is very simple. Suppose you are riding with lights out and wish to light up. First switch on the head lamp by its own switch, when all three lamps will light in series. Then switch over the two coupled switches, and the lamps will be put in parallel.

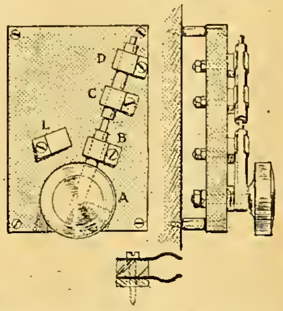
"It would be as well to put the side and tail lamp switches out of action, otherwise, if the lights were put out by either of these, it would necessitate stopping, or reaching over to them to light up while running."

Mr. J. Grundy: "I was very much interested in 'Chinook's' article on accumulator lighting sets in your issue of December 27th. I notice he requires a system, which will permit all three lamps being thrown in series if desired, for leaving the machine standing, and I have pleasure in enclosing a wiring diagram which fulfils this requirement. The switch at present in use would be replaced by a two-way change-over switch provided with an 'off' position; this could be purchased for a shilling or two, or could be made at home. There would be very little extra wire required, and the existing connections to all three lamps would not be disturbed. Two separate switches could be employed if desired, as suggested by 'Chinook,' but if the rider forgot to leave one in the 'off' position before switching in the other, a short circuit would be caused and injury to the accumulator would probably result."



Mr. W. E. Cottis: "In 'Chinook's' interesting article on accumulator lighting in *The Motor Cycle* for December 27th, 1917, I notice at the end he hankers after a system of wiring whereby he can switch all his lamps in series when standing the machine at the roadside. I give below a diagram, the wiring of which achieves this by the addition of a simple two-way switch, which can be made at home by anyone who is used to pottering about with a few tools. I also give rough sketches of how this switch can be made.

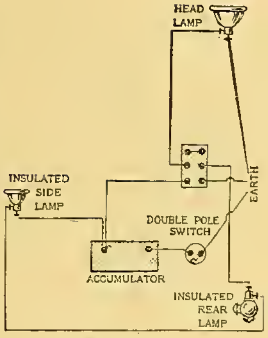


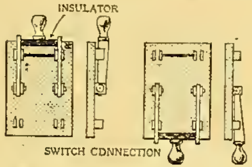


"The arm of the switch is made of hard wood or fibre rod with two brass sleeves over it so that when turned to the right it has the effect of shorting A to B and C to D separately. The current would then flow from the accumulator terminal F to A and through B to earth. Then from the other terminal G to H, through the tumbler switch to K, thence to M, through the head lamp, and back to earth. This gives full light at the head. Starting again at G, through H and K to D, through the twist switch to C, from there to N, through the side lamp to O, thence to P, through the tail lamp to earth, returning to the accumu-

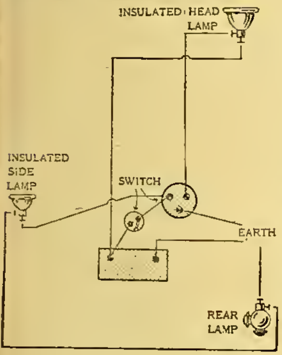
Wiring an Accumulator Lighting Set.—

ator through B and A and F, gives us the side and tail lamps in series. Now, by turning the twist switch to the left we get the current flowing from F to A through the switch to L, thence to N through the side lamp to O and P, then through tail lamp to earth. From here to the head lamp earth, through the head lamp, thence to M and K, returning through the tumbler switch to G. This gives us the whole three lamps in series. The tumbler switch is used for shutting off all lamps in either wiring."





MR. S. BARNETT: "'Chinook' is on a wild goose chase unless he is willing to make a certain amount of alteration to the principles in his system. I was once up against a similar difficulty, and as I often had to leave my machine standing its solution was a rather urgent matter. The accompanying diagram should make my method clear."

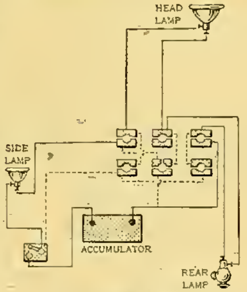


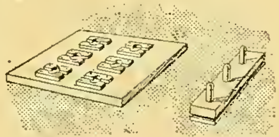
MR. E. WHALLEY: "'Chinook's' small difficulty can be overcome by utilising an extra two-way switch and altering the existing switch to the battery side instead of the earth; also the head lamp will have to be insulated as well as the side lamp. The only difficulty is that the head lamp will have to be operated by its own switch."

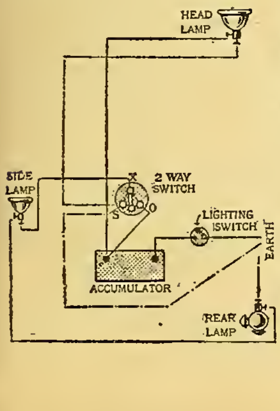
MR. C. A. COPINGER: "I have pleasure in submitting a simple means of accomplishing 'Chinook's' desired result, the only requirements being two three-way plugs, which he could make himself or obtain from any electrical stores.

"He, of course, would have to insulate the lamp fittings from the cycle frame, and this would be in any event a great improvement, as by using the frame as a conductor a much greater strain is imposed on the battery than occurs when using two good copper wires.

"In my sketch, by putting the plug top in the upper plug connects all lamps in series, and in the lower plug in parallel."







"SPARKS": "In view of the fact that 'Chinook' has three earth points, it is impossible to obtain the results that he desires, but by employing another switch and detaching a wire when the machine is at rest the following might suit:

"Two-way switch at O for running—*i.e.*, head lamp to E, side and tail in series to E.

"Two-way switch at S for stationary—*i.e.*, all lamps in series, but E to be disconnected at head lamp.

"Dotted line shows extra wiring required."

"C.E.S." says: "I should like to bring forward a system by which, as 'Chinook' suggests, all the lights may be left in series whilst the machine is standing.

"By adapting a Marvel change-over switch (A. P. Lundberg and Sons, Liverpool Rd., N.), and connecting it as shown, the desired result may be obtained.

"As will be seen, the Marvel change-over switch has six terminals, which are connected by the rocking contacts, as shown in fig. 2 (*b* and *c*).

"The connection shown in fig. 2 (*a*) is to be made by the person fitting switch. The No. 2 terminal is not to be connected in any way.

"The single pole switch is simply used for cutting the current off, the Marvel switch having no 'off' position."

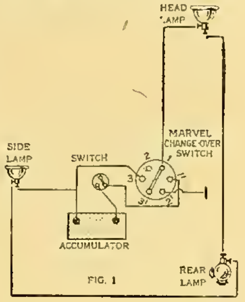


FIG. 1

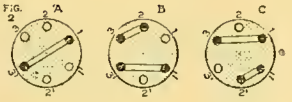


FIG. 2

AIR-COOLING FOR CARS.

ALTHOUGH motor cyclists, as such, are not necessarily interested in the engine arrangements of motor cars, an article by "Runabout" in our sister journal, *The Autocar*, of December 29th, should prove of general interest. The question of air-cooling for cars is the subject he takes, and from his own experiences he contends that this type of cooling for cars can be quite satisfactory.

Quoting a leading car designer, he says that no petrol engine can develop its full efficiency at the temperature of the boiling point of water. This implies, of course, that no water-cooled engine can ever be thoroughly efficient, because the cooling arrangements will break down before the engine really gets to work. The result of this discovery in the case of this particular designer has been the final scrapping of water-cooling, irrespective of horse-power and size of cylinders.

A Successful Air-cooled Car.

Most of our readers will be aware of the existence of the Franklin car—an air-cooled car that has for many years been on the American market, and has given every satisfaction under the most arduous tests and in the most regular service. "Runabout" dwells on an oft-treated topic when he says that experiences gained before the war are now so antiquated that they cannot be soundly applied as precedents in the judgment of such a question as this, and he says the dogma of the designer already mentioned is that with a proper cooling system and a suitably-designed cylinder it actually pays to run an engine at far greater temperatures than were previously regarded as allowable. Needless to say, there are still considerable obstacles to be overcome before air-cooling for cars can become a regularly accepted thing, and the two obstacles that give "Runabout" the most trouble are sparking plugs and the appearance of the complete car.

Personally, we are inclined to think that the sparking plug question can be easily overcome, and we agree that the appearance of a car is really judged only by what one is used to. When a novel design has become firmly established and is a common sight on our roads, it automatically becomes a standard of judging beauty in itself.

As "Runabout" says, custom is everything in these matters. In the early days of the motor car we missed the horse and reins; similarly the blunt and businesslike snout of a Clerget-engined scout aeroplane is not now regarded as anything very heterodox, but only different from the commoner type of plane.

The use of aluminium in cylinder and piston construction also has an important bearing on the topic of the air-cooled car, and, as all motor cyclists know, it is likely to be of great importance in the future development of the motor cycle. There is also little doubt that development of the air-cooled car will materially assist development of the motor cycle, as the two types, now so different, will tend to run, in engine matters at least, on convergent lines

THE LATEST PETROL AND GAS ORDER.

A Summary of the Motor Spirit (Consolidation) and Gas Restriction Order.

THE new Order, relating to which a preliminary announcement was made some days ago, has now been issued by the Board of Trade consolidating and amending the present Motor Spirit Restriction Orders and controlling the use of gas for driving motor vehicles.

So far as private motor cars and motor cycles are concerned no substantial change is made as to their use, but advantage has been taken of the experience gained from two months' working of the present Order to clear up points upon which some doubt was found to exist. The chief points are as follow:

"Necessary household affairs" means the obtaining and carrying of food, fuel, stores, medical and surgical requisites, visits to a registered medical practitioner, dental surgeon, legal adviser, professional agent, or banks, the conveyance of children or young persons to or from a school.

"Performance of a public duty" includes attendance at or upon any court of justice, or at or upon anybody or person exercising public duties, when such attendance is in connection with the business of such court, and the performance of their duties by officers of police and fire brigade, but for the purposes of this Order does not include attendance at a place of worship.

"Red Cross work" means (*a*) the conveyance of sick or wounded persons of His Majesty's Forces for hospital or medical treatment; (*b*) the conveyance of stores, nurses, and duly authorised officials to and from a hospital in connection with the service of the hospital where the journey cannot otherwise be reasonably and conveniently accomplished; (*c*) the conveyance of a member of a county or district committee of a hospital or of one of the societies hereinafter mentioned to a committee meeting where the journey cannot otherwise be reasonably and conveniently accomplished.

The Order also goes on to allow motor cyclists to take out wounded members of His Majesty's Forces who are otherwise unable to take exercise from and to hospitals for a total running distance not exceeding twelve miles when the journey is undertaken solely for that purpose, or to take them to and from places where they can rest or walk about if the medical officer certifies that such rides are necessary.

It is also pointed out that private motor vehicles may be used for station work in connection with a journey by rail or sea, and generally enlarges upon the items in the Orders which have previously been published.

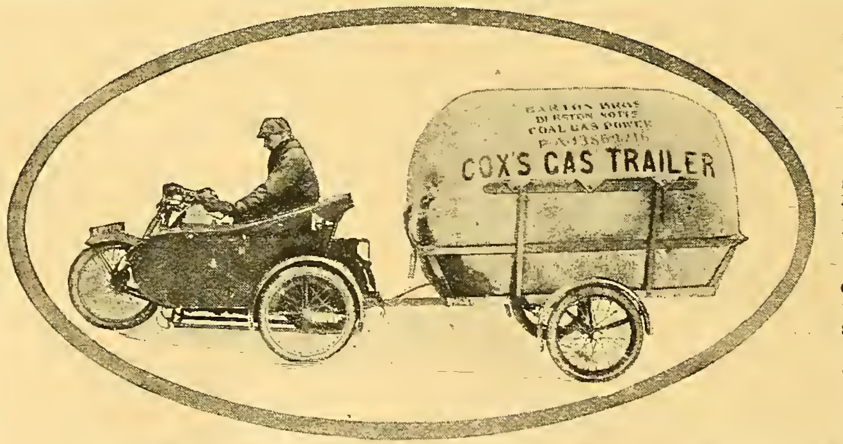
It is interesting to note that it is specifically stated that special permits may be issued for the use of petrol, petrol substitute, or gas for any purpose by any person to whom a special permit in writing has been granted by the Petrol Control Department, and that nothing in the Order shall prevent the use of petrol or petrol substitute obtained on a motor spirit licence, or of gas by the holder of a gas permit, for the purpose of driving a motor vehicle for a distance not exceeding twenty miles in connection with the sale or intended sale of such vehicle, provided that the seller has obtained the permission of the local superintendent or other chief officer of police.

Where at the date of this Order a motor vehicle or motor boat has been fitted with a gas outfit, it may be driven for purposes authorised by this Order without a gas permit until February 9th, 1918. A permit must then be obtained.

* * *

COAL GAS IN PRACTICE.

A Continuation of our Notes founded on the Daily Use of Coal Gas.



IT is an acknowledged fact that improved results are obtained with coal gas if the charge be heated ere it gains the engine, and in running on gas a distinct improvement is noticeable after the induction pipe, etc., has become thoroughly warmed up. In starting it is necessary to turn the gas pretty well full on, otherwise popping back, owing to too weak a mixture, occurs, but immediately the engine is heated up the gas supply can be turned off to the merest sniff.

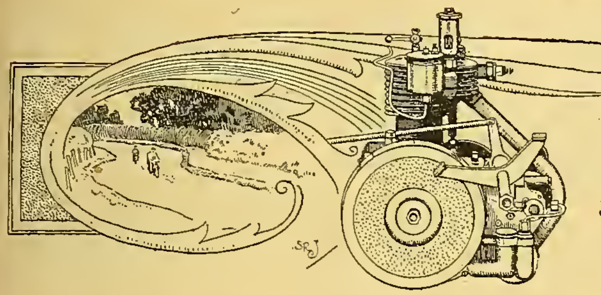
Recently we experimented with a new fitment which permitted the induction of a considerably increased volume of air, it being thought that the air intake used hitherto was somewhat restricting the charge. The fitment was first tried on a comparatively mild evening, and gave perfectly satisfactory results. A keen frost occurred during the night, and next morning, the air being contracted by the cold, a much larger proportion was drawn into the cylinder, and the engine simply would not run at all, owing to too weak a mixture, till we had partially jammed up the air intake by means of a wedge-shaped wooden plug.

Recently, when discussing the matter of coal gas with a Ford van driver who is running his vehicle on this substitute, we came to the conclusion that we were obtaining comparatively good results. This driver, together with several others with whom we have talked, said that he was just able to do his round and nothing more, and that low gear work was constant.

Many of these van drivers complain of overheating, which shows that they are using too rich a mixture. An engine will run on an over-rich mixture of coal gas almost as well as on a correct mixture, the only difference being the ultimate boiling of the water in the radiator, or, in the case of an air-cooled engine, a sparking plug or exhaust valve becoming red-hot. In the case of a water-cooled engine much nicety of adjustment is necessary. The engine is started up on a fairly rich mixture, and the tap then turned off till misfiring begins. Just short of this point is considered correct, but by the time the engine is heated up this mixture is very much too rich, and better results would be obtained if the supply were turned off still further—to a point, indeed, at which the engine would not run when cold. The ordinary gas tap is not sufficiently sensitive to enable the best results to be obtained.

The volumetric efficiency of an engine when using coal gas is essentially lower than when petrol is the fuel used. Whatever pains be taken to vaporise the petrol charge thoroughly, a certain amount of liquid fuel, probably in the form of a wet spray, inevitably gains the cylinder, where it is vaporised by the heat of the piston and the cylinder walls, increasing in volume something about 200 times during the process of conversion. This, of course, does not occur when a dry gas is used, and the only possible method of obtaining a similar result would be to induce pure air and inject the coal gas in a highly-compressed form at the top of the compression and during the firing strokes.

We do not hold up the imperfect vaporisation of petrol as a point in favour of its use as a fuel, but merely mention it as one reason why a higher compression ratio is advisable with coal gas.



ACCESSIBILITY.

SOME CANDID NOTES ON DESIGN, NUTS, AND OVERSEAS TRADE.

By "IXION."

I HAVE just spent a very lurid week in taking to pieces two machines which had been grossly neglected under pressure of war work, and I am now thinking of setting up in business as an accessibility expert. I shall take an office in Portland Street, get hold of the current model of each leading make, take it to pieces, note its defects in respect of accessibility, consider how they can be eliminated either by inexpensive or costless alterations in design, or by the provision of a special tool. I shall then approach the guilty firm, and get well and truly kicked downstairs for my pains. The callousness with which some makers handle this most important subject is really amazing. They are too often content if their own assembling mechanics, armed with special kits, can get the 'bus apart, or together, in a reasonable time; but they have not sufficient imagination to picture the struggles of a private purchaser, possibly resident 300 miles [or 3,000 miles?—OVERSEAS EDITOR] from the works, and ten miles [100 miles?—OVERSEAS EDITOR] from a decent repair shop. Here are actual instances of the fat-headed sort of detail which gets embodied in first-class machines. On a certain machine the front chain can only be adjusted by sliding the engine; the details are fairly well thought out, except that the exhaust pipe fouls the gear box as soon as the engine is moved forwards. The designer has obviously devoted a great deal of thought to his exhaust pipe, which is literally the best designed on the road; but, as soon as the front chain gets slack, you must either buy a new chain or spoil the streamline exhaust pipe by dinting it with a coal hammer.

3D.

THE PRICE OF THE MOTOR CYCLE

TO BE RAISED TO 3D. ON FEB. 7th.

This further increase is necessary owing to the drastic restriction imposed on the import of paper and paper making materials during 1918 and the consequent heavy advance in the cost of paper, but the price will be reduced as soon as circumstances permit.

The subscription rates will be correspondingly raised on renewal or to new subscribers:

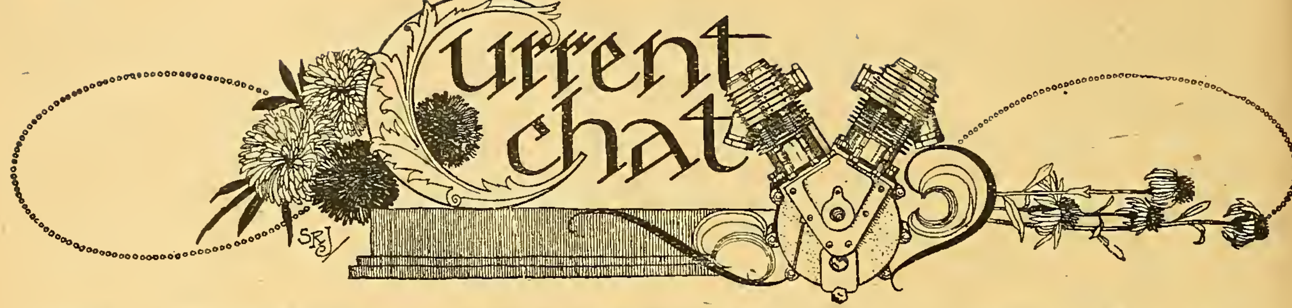
British Isles	15/2 per annum, post free.
All countries abroad..	19/6 „ „

All subscriptions current at the time of reducing the price will be proportionately lengthened for the benefit of each subscriber.

Another Example.

A gear box had to be taken apart because a ball race had begun to rotate in its aluminium bed. The makers might say such jobs ought to be returned to their works, but Overseas owners cannot adopt this method, and no user resident in the more remote corners of England wants to lose his machine for a week or so, for a simple little job that any decent mechanic ought to be able to do in an hour. It took three men four hours to take that gear box to pieces, and the whole trouble arose over two nuts of standard sizes. There were in the garage half a dozen spanners to fit each nut, though the kit supplied with the bicycle contained none. But each nut was so curiously and stupidly located that none of the special spanners available could get a hold. Each nut had to be punched off with a chisel, and, as they were light nuts, the job would have been held up to await the arrival of new nuts, if the nuts had been tight. Luckily, however, they were a trifle loose and came away readily. In no case was there the least reason for the awkward placing of the nut, and I could have redesigned the part to give an ordinary adjustable spanner easy access without any addition to the cost.

British riders are, of course, tolerably cynical in the matters to which the above paragraph refers. When they buy a new machine they take it for granted that they will have trouble in their repair and adjustment work, and they are rarely disappointed. Some of us regularly resort to professional assistance, and you may often see two or three mechanics kneeling on a part of a motor cycle on a garage floor whilst another tackles some immovable detail with a mallet and a tyre lever or other butcherlike combination of tools. Some of us gradually amass a wallful of assorted spanners, and can generally pick out something to suit a crazy designer's latest whim. We worry through somehow. But we have been talking very fine and large about our Overseas trade after the war. It has great possibilities, and is generally understood to depend upon our offering Overseas buyers a first-class machine at a reasonable price. That is only true as far as it goes. It is the first instalment of success. If we offer Overseas buyers a machine equal to our best pre-war mounts at a cost of £25 (which is, of course, impossible) we shall still lose our Overseas trade unless that cheap, high-grade machine is either perfectly adapted to management by its owner, or unless we provide what the Americans call "good service," *i.e.*, a sprinkling of live, sensible agents, thoroughly furnished with tools and spares. Most of our exported machines have been marred by one or more items unsuited to local conditions.



Current chat

Times to Light Lamps.

Greenwich Time.

Jan. 10th	4.41 p.m.
,, 12th	4.43 ,,
,, 14th	4.46 ,,
,, 16th	4.49 ,,

Women Motor Drivers for Home Service.

The Women's Legion is now giving free instruction in motor driving for Government work with free accommodation during training.

No More Men Drivers.

The idea is that all Government motor vehicles will shortly be driven solely by women, although we should imagine that some limitation is bound to be applied in the case of drivers for big lorries.

A Chance for Lady Motorists.

Any lady interested should apply to the offices of the Women's Legion, which are situated at 18a, Pall Mall East, S.W.1.

Coal Gas.

The Commercial Motor Users' Association has in course of preparation a list of gas-charging stations throughout the United Kingdom, and the first issue, containing some 1,000 names, will be ready shortly. It will be obtainable on application to the secretary, 83, Pall Mall, S.W.1.

The Local Taxation Licence.

We are receiving many enquiries from correspondents asking if it is necessary, in the case of a motor bicycle which is kept but not used, to dismantle any part of the engine or machine, so as to satisfy the taxation authorities that it is exempt from the tax. This is not necessary; the tax need only be paid in respect of a motor bicycle which is used at any time during one year.

Naphtha.

One of the most popular petrol substitutes in those days when substitutes could be freely used, although petrol was restricted, was "solvent naphtha." This is a substance belonging to the benzene series, and it bears to benzole much the same relation as paraffin (or kerosene) does to petrol. It is, of course, obtained as a by-product in the fractional distillation of coal.

All *dealing* in this substance is now forbidden except by Ministry of Munitions permit. The comprehensiveness of the new Order is indicated by its wording, "No one shall supply, take, accept, or attempt to obtain delivery." Is it a cause for thankfulness that this latest Order does not affect motorists?

Activity by an Automobile Body.

The A.A. and M.U. has urged to the Treasury that some modification should be introduced on motor taxation for 1918. The grounds for this representation are that limited fuel supplies will naturally severely restrict the amount of use to which motor vehicles may be put.

How to Cure Belt Slip.

A correspondent writes, with regard to belt slip on a 5 h.p. Zenith, that he was troubled with this form of annoyance a good deal with both rubber and leather belts until he fitted a leather mudshield. He is now able to ride on the worst of ordinary roads in the worst weather, and the belt is kept quite clean and dry.

Decarbonising an Engine.

A correspondent sends us the following wrinkle for decarbonising an engine. First soak the parts to be decarbonised for at least twenty-four hours in a hot solution of strong caustic soda, afterwards washing the parts in cold water (not forgetting to wash the hands); then dry them and insert them in a paraffin bath. After that any carbon then remaining is quite easily removed.

ENGLÄNDERLAGER, RUHLEBEN, GERMANY.
XMAS, 1917.
With Best Wishes for Xmas for 1918.
from T. Hilger

FROM RUHLEBEN.

A Christmas greeting card received from Mr. T Hilger, now a prisoner in Ruhleben. He inscribes the card, "How to keep cheerful—read the 'Blue un.' I still get it."

Special Features.

WIRING AN ACCUMULATOR LIGHTING SET.

THROUGH RUSSIA, TURKEY, AND ROUMANIA.

OUTSIDE FLYWHEELS FOR V TWINS.

Speed Merchant Honoured.

Capt. L. G. Hornsted, who in July, 1914, did 124 m.p.h. at Brooklands in a German car, has been mentioned in despatches.

Motoring in Holland.

It is stated that as a result of the petrol shortage all private motoring in Holland is to be forbidden, also a strict control of military motor vehicles is to be instituted.

And in Spain.

In Spain a similar shortage exists, and while, as far as we are aware, no definite legal restrictions are in force, the running of public service as well as of private vehicles is unavoidably much curtailed. The Government is on the point of introducing the English control system. Spain will wake up one morning shortly to realise what a terrible war this is.

Special Activities.

In Coventry on Thursday morning last—and possibly in other parts of the country—the specials were holding up every type of motor vehicle, whether car, lorry, or cycle, and demanding permits and petrol cards. No doubt many summonses will result. Personally, we were using coal gas when stopped, but this made no difference in the usual formula being followed.

There was a rumour afloat that the Coventry specials had demurred that no cars were being held up for an examination of permits, while there had been several motor cyclists summoned, at which the police replied, "Very well, then; you specials shall have a special day to yourselves, and stop every motorist you see." Needless to add, we very much doubt the truth of this report.

Identification Marks.

When a machine had been stopped, a small white disc, bearing the number of the special who had stopped it, was fixed to the front wheel mudguard. A party of testers were amusing themselves by sticking these discs on various obscure portions of their machines or their own persons, with the result that they were stopped again, and the entries duplicated.

What will be the next step in the process of elimination?

Century of Engineering.

On January 2nd the Institution of Civil Engineers completed the hundredth year of its existence, having been established on January 2nd, 1818.

An Extraordinary Smash.

On the Eltham Road, S.E., shortly before midnight recently, a motor lorry ran into a column of partly lame and disabled A.S.C. men, placed six *hors de combat*, then overturned. Someone rang a fire alarm that brought a motor fire engine and salvage car to the scene! On the latter the wounded were removed to hospital.

A Hard-worked Sidecarrier.

An early Bat sidecarrier, owned by the proprietor of the only store at Keston village on the Westerham Road, must have a lengthy service record. Daily and in all weathers the outfit can be seen with its veteran rider on delivery rounds in a hilly district.

A New Oilfield.

In these days of increased demand for motor spirit, it is gratifying to note that a new oilfield of considerable importance has been opened up about eight miles east of Los Angeles. It seems probable that about 2,000 acres will prove productive. One well put in by the Standard Oil Co. is yielding about 7,000 barrels a day from a depth of nearly 3,800ft.

Motor Cycle Messengers in the U.S. Army.

For conveying information regarding the dead and wounded of the U.S. Army in France, motor cyclists will be utilised to a great extent, and will carry the tidings over the first part of the journey from the trench and battle lines to the divisional headquarters. Messages will then be telephoned and cabled to Washington, whence the War Department Statistical Bureau will forward them. Through this organisation relatives and friends should receive news within two days, and possibly within twelve hours.

Methylated Spirit.

Owners of water-cooled machines are at this time of the year always concerned as to the safety of the radiator when the machine is standing overnight in an unheated garage. Various anti-freezing mixtures may be used, and one of the most popular of these is methylated spirit. An Army Council instruction recently published forbids the use of this medium in Army vehicles for this purpose. Last winter, in France, it was common practice to run lorry and other water-cooled engines all night, so as to make sure that they should not freeze, and, of course, incidentally, to avoid considerable starting difficulties in the morning.

Motor Cycles by Passenger Trains

We were informed by a well-known member of the motor cycle trade that the railway companies now refuse to accept any article weighing over 112 lb. by passenger train. Consequently only featherweight motor cycles are accepted, and all others must travel by goods train. This would necessitate their being packed in crates. However, when we recently rang up the Railway Clearing House on the subject, they informed us that they knew of no regulations preventing the carriage of motor cycles by passenger trains.

There seem, however, to be various new rules of which the officials themselves are not aware. In an out of the way village station over a year ago the stationmaster refused to accept a motor cycle for carriage by train. The machine was ridden twelve miles to a more important station, where it was accepted without question. A good deal seems to depend upon local congestion of traffic.

A Patriotic Motor Cycle Club.

Fifteen out of eighteen members of the Indian Motor Cycle Club, Chicago, are in training with the U.S. Army. The remaining three are exempt from service. This is certainly a very fine percentage.

The Italian Coventry and the War.

Turin is the motor manufacturing centre of Italy, and it is interesting to note that this town recently subscribed £300,000 in one day in aid of refugees from the territory now in the hands of the enemy. In addition, the 25,000 Fiat workers voluntarily decided to contribute one day's pay per month for six months to relieve distress caused by the invasion.

Collision between Motor Cycle and Aeroplane.

A curious accident happened at the Leeside Aerodrome, Toronto, on December 5th, when an aeroplane collided with a motor cycle and sidecar. This is the first mishap of its kind known. The accident took place when Capt. J. N. Bacon, R.F.C., was making a forced landing in a street in the vicinity of the camp. The propeller smashed the sidecar outfit, and instantly killed the corporal and air mechanic who were in it, while the aeroplane itself was seriously damaged. The motor cyclists were preparing to go to the assistance of the airman, who was seen to be in trouble.

The National War Funds.

The National Relief Fund (distributed £3,743,877)	£6,318,092	0	0
British Red Cross Fund	8,711,420	0	0
Tobacco Fund	146,083	0	0

Petrol for Motor Cycle Specials.

Lee special constables owning motor cycles have been informed they can obtain petrol free at the head station on the receipt of raid calls. The machines are used for giving warning and also the "all clear" signal, and can cover more ground than pedal cycles.

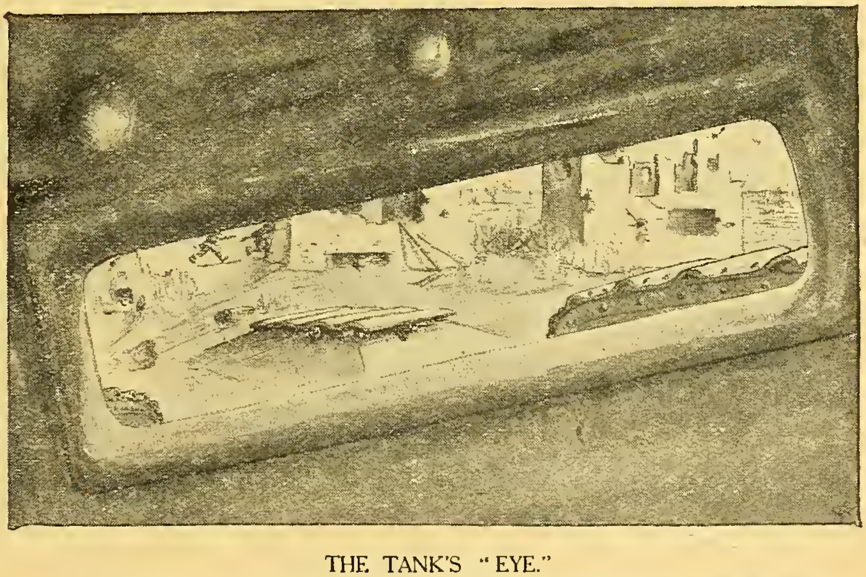
Smart Machines.

One of the smartest machines one sees undergoing test in the Coventry district at the present time is the new model 5 h.p. twin Rover, the red tank and green finish of which are extremely attractive. This machine has an all-enclosed chain drive, as our readers know, and looks a very enticing solo mount, though the handle-bar position appears rather high for perfect control.

Stop Thief!

It is not often that the Order of November 1st provides amusement, but we recently saw an incident at once amusing and exciting (!) caused directly by this motorist's sword of Damocles. A very old and noisy single-cylinder two-seater car was, with the hood up, rounding a corner in Coventry, when two Specials, standing on a refuge in the middle of a rather wide crossing, began shouting and wildly gesticulating for the car to stop. Whether deliberately or accidentally we do not know, but the driver took no notice, and his rattle box kept merrily on. One of the Specials then gave chase, caught up the car on the near side, and, seizing one of the hood sticks, swung himself in correct Yankee police style on to the running board, and ordered the driver to stop and justify his existence!

What surprised us most was the fact that the hood stick stood the strain to which it was so suddenly subjected, and we wondered what would have happened to the zealous Special had it given way.



THE TANK'S "EYE."

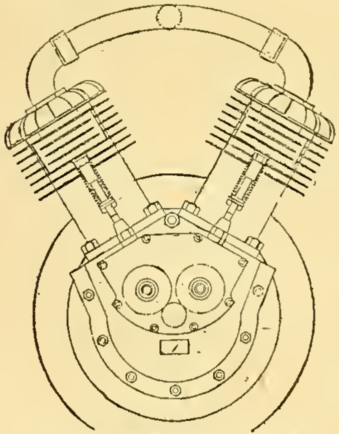
The drawing, which is from a sketch made by Pte. Eugene Fuller, now in Maidstone Hospital, illustrates the skill needed by drivers of the Tanks, the field of vision being so limited, and even this is not direct sight, but reflected through a prism.

OUTSIDE FLYWHEELS ON V TWINS.

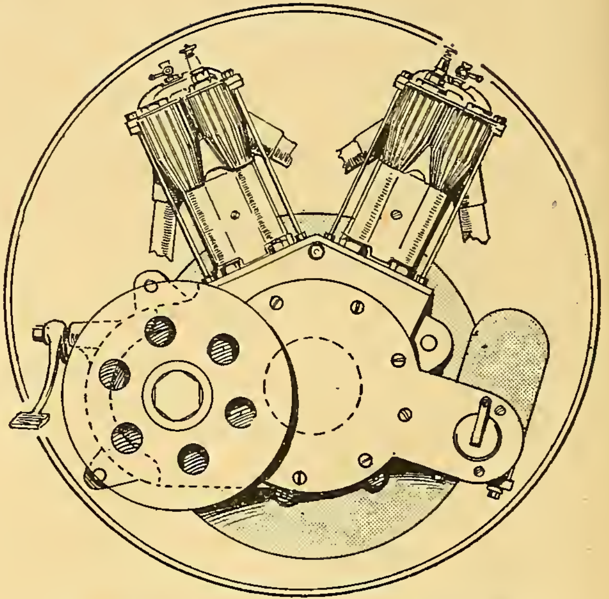
A Revival of Interest in the Question of Outside Flywheels on Engines of the V Twin Type.

A CORRESPONDENT who writes on a postcard and does not sign his name, so that we are unable to reply to him, says: "Why not a V twin with an outside flywheel? I cannot remember ever having seen this discussed in 'The True Blue.'" He signs himself "Since 1903," and yet in the issue of April 17th, 1905, there appeared a description of a motor bicycle made by Mr. Anthony Westlake, which had a V twin-cylinder engine provided with an outside flywheel 12½in. in diameter. The engine dimensions were 78 mm. × 90 mm., and the inlet valves automatic. Two sparking plugs were fitted in each cylinder, two outlets were provided for the exhaust below each valve, and two B. and B. carburetters were provided. It was specially built for the International Cup Race, but unfortunately never survived the eliminating trials. Its designer, Mr. Westlake, was the first secretary of the M.C.C. To the best of our recollection the early Clement-Garrard V twin was also equipped with an outside flywheel.

This anonymous correspondent's communication, strange to say, coincides with a very interesting letter from "Howitzer, R.G.A.," enclosing specification of a 50° twin with outside flywheel, and also with a letter from Mr. J. Graveson on a similar subject, and it would almost appear that for some mysterious reason interest in the V twin with even firing impulses and outside flywheel has suddenly revived. One point that seems to have escaped the notice of practically all the correspondents is that there is nothing fresh in the idea of the V twin with even firing impulses and an outside flywheel, and indeed so recently as 1911 the Premier Cycle Company, of Coventry, had on the market an excellent machine with a power unit of this type. The Premier twin enjoyed a fair amount of popularity, and was in every way a successful machine. It was commended in all quarters for its even running, silence, and sweetness of transmission, and among the advantages claimed for it by the makers were the reduction of the risk of skidding on account of the smooth torque of the engine; less tyre wear and tear, for the same reason; and also improved hill-climbing power. The accompanying illustrations show the complete machine, and also the engine of this interesting mount, which, it should be remembered, had several years before passed out of the experimental stage. It will be seen that there is nothing whatever freakish in the design of the complete machine, and that the power unit is very compact.



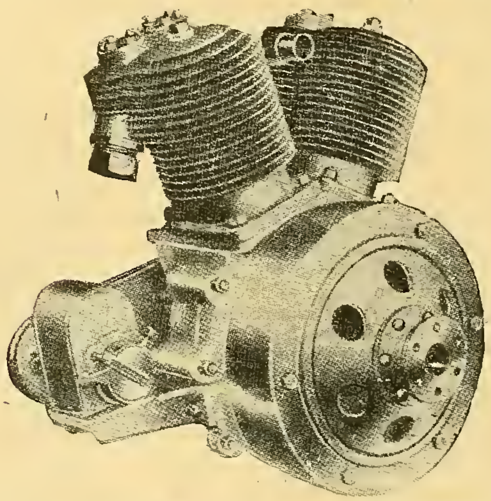
A V twin with outside flywheel, made by Anthony Westlake in 1905.



A design of a V twin with outside flywheel submitted by "Howitzer, R.G.A."

The letter from Mr. Graveson is as follows:

I had intended making a V twin motor cycle engine with outside flywheel after the same style as the horizontal twin in nearly every respect, but time has been against me, so I offer the idea (I have since found it is not quite new) to anyone who has a little spare time to work on it. The V twin can be made to fire at equal intervals, the same as the horizontal twin, by giving the crank the same amount of angularity as the cylinders (roughly). Of course, the crank will have to be of the double throw type, as in the horizontally opposed engine, and the cylinders staggered a bit to allow a direct thrust from the piston, but that would assist the cooling of rear cylinder.

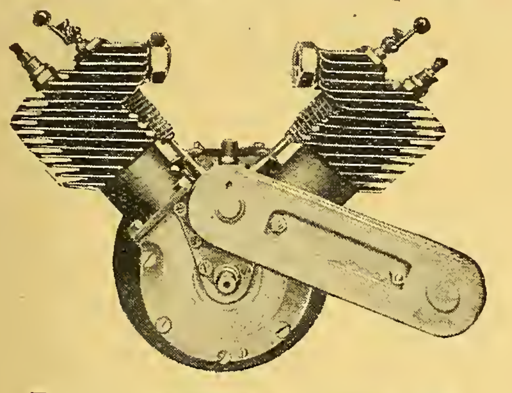


The Fafnir, 85 × 88 mm., having an additional outside flywheel in which was incorporated a clutch.

Outside Flywheels on V Twins.—

The advantages of this type would be the retaining of the present popular type of frame, lower centre of gravity [?—Ed.], and less cost to produce.

Balance should be as good as in a flat twin, and a little more or less angularity of the crank pin would give the desired balance. The size of engine would not be limited, as in the horizontal, and there would be ample room for gear box, etc., without unduly elongating the frame of the machine.



The 3¾ h.p. Premier twin first produced in 1909. The bore and stroke of the engine were 66 × 80 mm., the cylinders firing at even intervals

I should like to hear if anyone has tried this type, as I do not see any difficulty in designing the V to equal the horizontal in equal turning moment and vibration. The majority of writers seem to forget the Scott in their arguments, and it is rather surprising that no Scott riders have had a word to say during the controversy of the flat twin, as the Scott has undoubted advantages, which I will leave to the makers for elucidation.

It will be seen that Mr. Graveson recommends a 90° twin, which is after the style of the old Premier. "Howitzer R.G.A.," however, suggests a 50° twin, and illustrations of this engine and complete machine are reproduced in company with his letter, which, as it speaks for itself, we think we cannot do better than reproduce in full:

Sir,—I am venturing to enclose rough drawings of my ideal motor cycle, and would emphasise the fact that it is intended only for solo use, and would be advertised and sold for this purpose. The design is prompted by the following considerations:

1. A machine capable of taking a sidecar inevitably suffers as a solo.
2. Clutches are expensive, not always satisfactory or reliable, and, unless accompanied by a kick starter, rather useless. Kick starters are very seldom reliable, and at best very much more laborious to work than it would be to paddle off a properly made engine on an 8 to 1 gear.
3. Noisy valve gear and oil slinging are two vices common to every British motor cycle I have owned, except the poisonous two-stroke, which easily makes up in the latter what it lacks in the former.
4. Chain and belt drive involves carrying repair outfits for both, and the gear box must have room to slide. All chain drive calls for a shock absorber, which, though often perfectly satisfactory, costs money to make.
5. A tank holding 1.9 gallon is a permanent nuisance, and it is not dignified for a manufacturer to advertise the tank as holding two gallons when it does not.
6. Coned petrol taps almost invariably leak, while screw-down ones do not.
7. Breadth in the engine is quite immaterial if the tank be made wide in proportion, so as to keep the rider's calves from getting cooked.
8. The merits of the outside flywheel have been discussed *ad nauseam*, and are really overwhelming. They have made the Douglas famous, and even secured a brief toleration for the awful two-stroke.
9. I cannot personally discover any carburetter on the market to touch the Schebler for general efficiency and petrol economy. It has only two drawbacks, viz., its price and the fact that it demands a small amount of horse sense to get the best results from it.
10. The British maker says to himself, "I will now produce a machine of 500 c.c. and see what I can make it do." The purchaser says, "I require a machine to do so and so." Hence the two are at cross purposes *ab initio*.

SPECIFICATION.

Engine.—50° V twin, detachable heads carrying valve pockets and ports. Roller big ends and crank on tuning side a separate piece. Outside flywheel. Gear drive from flywheel side by herring-bone gears to Douglas pattern two-speed gear box, and by belt from off side of gear box. Gear shift by pedals protruding on each side behind gear box. Carburetter, Schebler, with twist grip control. Dimensions, 65×90 to 75×90, as found necessary. Valve spring covers screwed to bosses on crank case, and having leather washers to stop all leakage.

Tank.—Harley-Davidson pattern double tank holding two gallons in main tank and about half a gallon in small tank. Screw-down taps. Large fillers. Euk starter inside tank.

Wheels.—28×3.

Brakes.—Flywheel brake on near side. Rudge belt rim brake on off side. Both pedal operated.

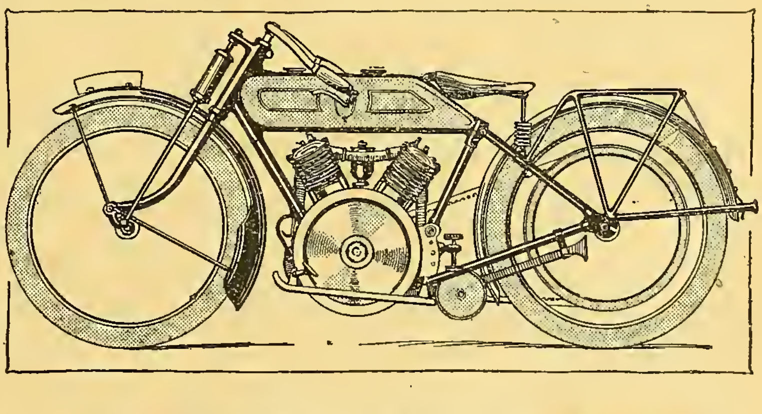
Saddle.—Pivoted on top tube springs to brackets on back stays.

Lubrication.—Hand pump with tap and intelligence.

Forks.—The old Druid is really just as good as any.

Lydd. HOWITZER, R.G.A.

These efforts at the outside flywheel on a fairly large size V twin machine are, of course, quite different from those big twins that have had an extra flywheel added on to the ordinary crank case which already has two internal flywheels. Only a few engine makers have deliberately fitted an outside flywheel to their engines extra to the two inside the crank case, other than in the case of the Fafnir engine, which had an extra outside flywheel, as shown. This flywheel, however, incorporated a clutch, and, of course, it is quite common practice to add a clutch and a combined flywheel on to a V twin motor cycle engine when incorporating this into any form of cycle car frame; in fact, nearly all cycle cars have a combined flywheel and clutch added on to the engine shaft. Certainly in this case the main object of the addition was the provision of a clutch, and the flywheel effect of this was quite incidental; nevertheless it was none the less present, and, we may say in passing, useful.



A V twin motor cycle designed by "Howitzer, R.G.A.," having several features of interest, besides the outside flywheel.

Letters to the Editor

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

ENGINE BALANCE.

Sir,—Would you be generous enough to spare a little space in your correspondence columns and insert the following query, which the makers have not answered? I have a single of great repute, 79×100, and when running fast there seems to be undue engine vibration. Now, there must be many riders of this type of machine who know their engines from A to Z. Could anyone tell me (*viâ* these columns) where the piston comes to rest? Mine comes to rest 47° from bottom centre, valve out and belt off of course. Wishing *The Motor Cycle* every success in the New Year and all the best of wishes. NORTONIAN.

Basingstoke.

GOODS MADE IN GERMANY!

Sir,—Your correspondent "R.O.W.," in your issue of the 3rd inst., states that, in his opinion, the notice which you print weekly is "unworthy of a sporting paper." Mr. T. Jones and his friends apparently take the same view.

Surely, sir, on reflection, these gentlemen must see that it is just the clean sporting and technical papers, of which *The Motor Cycle* is certainly one, which should take a strong line in the matter: quite apart from any question of politics, or economics, or trade after the war.

We Britishers have many faults, and this war has emphasised them in many ways, but one virtue is accorded us by general consent—we are clean fighters, and, in ordinary circumstances, are always ready to shake hands with the enemy when the fight is over. But we are now dealing with a foe who has furnished overwhelming proof of his bestial cruelty, his devilish methods, his scornful rejection of all the laws of humanity, his untrustworthiness, his cunning, and his hate. There is no need to give details. Who does not know them? We have to make that foe realise that he is not fighting as a clean sportsman, and when we have beaten him, as we shall, we have to teach him that foul play, which usually incurs penalties, must do so in his case.

If the Germans are "victims" to Prussianism, as "R.O.W." suggests, will he tell me how, or why? No, sir, it is within the power of the German people to overthrow Prussianism. Until they at least show signs of a desire to do so we must regard them as in sympathy with its vile methods, and, indeed, as active agents and co-operators. The German people must purge themselves of the evil which seems to have permeated every fibre of their being—every activity of their national life—before we can shake hands with them again.

Meantime, the proprietors of *The Motor Cycle* deserve the thanks of all true sportsmen for the stand they have taken in this matter, not least because it is evidently a line of action, which must mean a loss of advertisement revenue after the war.

I should like to deal at length with the commercial aspects of the matter, and, in particular, to tell "R.O.W." something about Bosch *v.* British magnetos, but space does not permit, although perhaps you will allow me to refer thereto in a later issue. BRITISHER.

London.

Sir,—As a free trader who wants the inhabitants of these islands to have access to the whole of the products of human ingenuity, and also as one who realises that we shall have to live along with the Germans after the war, I confess to sharing the contemptuous irritation of your correspondent, Chas. S. Ives, whenever I saw your announcement.

But I remembered that this non-party publication had but given, in a definite, forcible way, patriotic adhesion to the policy of an economic war after the war agreed upon by our national Government at the Paris Conference.

That policy, however, has recently been repudiated by Cabinet Ministers in the name of the Government. It follows, therefore, that the patriotism which gave birth to the objectionable paragraph now calls for its burial; and I am wondering whether you, in your wisdom, will ever allow us to see it again. H. LEAVIS.

[We commend to our correspondent a perusal of the pamphlet "Murder Most Foul."—ED.]

Sir,—Having read the letters of Mr. C. S. Ives and "R.O.W." *re* trading with the Hun after the war, let me ask these "so-called" Englishmen if they have ever met the Hun since August 4th, 1914. I am "one of those who went" in 1914, and have witnessed some of the German acts of "Kultur," and rather than earn my living in any way that would help or assist the Hun, I would sooner finish my life in the workhouse—aye, or even a prison.

Why encourage the Bosch when there are thousands of men "out there" who, with a little training, can turn out a magneto as good as, even better than, any German?

I have held a position in a large motor establishment—a position as sales manager—so have a little idea of the article in question.

May *The Motor Cycle* and all other motoring periodicals publish each week their resolution, as they have been doing, and so encourage articles to be "solid British," made by "solid Britishers."

The remarks in Mr. C. S. Ives's and "R.O.W.'s" letters are rotten to the core.

Wishing your journal every success,

Kingston. SILVER BADGE.

Sir,—I am astonished to think that there are men in this country, presumably British subjects, who are ready to trade with the unspeakable Hun at the expense of the British nation after the war! We have for some time past been only too familiar with the "Conchie" and the "Pacifist," and it is now with sorrow that we must add to these friends of the Hun yet another class—the followers of Mr. C. S. Ives.

One of the very points for which the Hun is now fighting is post-war trade, and it is up to the buyers of this country to see that he does not make advances on a wide front in the war after the war.

Does not Mr. Ives realise that the Hun is guilty of every indecent act, every immoral act, and every dastardly act imaginable? Yet he suggests that we should support him and fraternise with him after the war! Surely it is more seemly that the Hun should be counted as outcast and unfit for decent people to trade with as a punishment in a small degree for his many crimes.

I am sure you will not shed tears at the withdrawal of the subscription of one who, by his own admission, is willing to trade with the Hun.

I am equally sure that there are thousands who would throw your paper over if you did not follow the course upon which you have decided. We shall not want any magneto or any part of enemy manufacture after the war, as experience has already shown that British makers have nothing to fear from the enemy.

N. R. CHANDLER,
Hon. Sec., Derbyshire and North Stafford Automobile Club
(Motor Cycle Section).

TWIST GRIP CONTROLS.

Sir,—I should be glad if you could find room in your paper for the following appreciation of the twist-grip type of control as fitted to American machines. A majority of people harbour the mistaken idea that they are liable to twist when one does not want them to, *i.e.*, when going over a bad bump, etc. Motorists who have had the pleasure of riding machines fitted with the above type of control will agree with me that this is utterly fallacious. The steering as well as the throttle and exhaust lifter are fully under the rider's control. There are no fiddling levers to "wangle." Give *me* an automatic carburetter with twist-grip control, and an exhaust and spark control interconnected, likewise operated, thereby doing away with two levers. Provided they are packed with grease, they give very little trouble, much less than the existing levers with their attendant wires, etc. I should very much like to see British machines fitted with the above, as I hope they will be after the war. I should like to have your readers' views on these twist controls, as I cannot imagine why there is not a *single* British machine fitted with them.

L. MERLIN.

THE STRENGTH OF MATERIALS.

Sir,—I enclose particulars of some tests taken by myself. I regret that I am unable to give fuller particulars owing to lack of time, but it will be possible to analyse exactly how metal behaves under tensile stress from the graphs shown. The graphs were plotted automatically, and are not subject to errors of observation.

A. C. CASS.

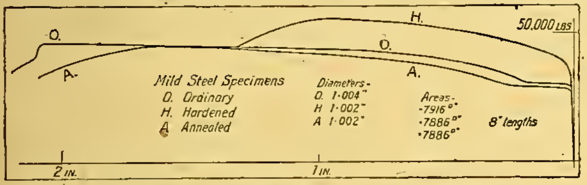


Fig. 1.—Tests of mild steel on an automatic machine.

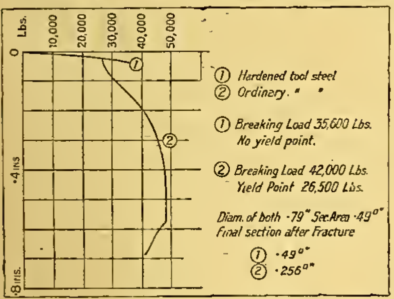


Fig. 2.—Facsimile of graphs plotted automatically on a 45 ton testing machine.

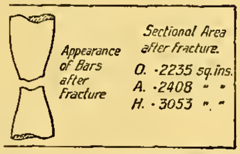

Appearance of Bars after Fracture
Sectional Area after fracture.
O. ·2235 sq. ins.
A. ·2408 " "
H. ·3053 " "

Fig. 3.—Fractured bar.

It will be seen that a load of 50,000 lb. has been applied before fracture takes place, although the breaking load is 42,000 lb.

TWO-STROKE RATTLE.

Sir,—An apparent cause of two-stroke rattle is that the rings passing the ports in the cylinder walls appear to be forced slightly into these ports, and give a decided noise when they are again forced into the piston. In an ordinary two-stroke engine there are found two piston rings on the upper part of the piston as a general rule—the top ring a compression ring, the bottom ring a wipe ring. The top ring is, as a rule, one of the hottest parts of a two-stroke engine, owing to the force of the explosion, and also owing to friction with the cylinder wall, as most of the oil is kept off it by the lower ring.

The average maker does not allow enough clearance between the two ends of the upper piston ring, which, owing to the high temperature under which it works, expands until the two ends press tightly together, thus endeavouring to cause it to take up more room than the bore of the cylinder; this causes undue friction, especially as it passes over the ports into which it frequently expands. After running a short time the ring usually gets so hot that it seizes up in the groove in the piston—as all two-stroke riders know.

The best remedy appears to be to use the lower ring as a ring to maintain compression, and use the upper ring as a wipe ring. I have obtained the best results by making the width of the top ring 75% of the width of the piston groove, and allowing when cold a gap of $\frac{1}{4}$in. between the two ends of the top ring. This does appear greatly to affect the compression, provided that the bottom ring is a good but loose fit.

I have cured numerous two-strokes of their rattle by this means, and considerably increased the speed of an Allon.

Solihull. LIEUT. R.F.C.

FLYING FACTS AND THEORIES.

Sir,—May I, in conjunction with "Commonsense," express the hope that Mr. W. G. Aston will again come forward to convince "O.J.F.S." and Mr. Brittain that their theories *are* wrong?

Although I have never met Mr. Aston, and only know of him from the very sound articles he contributes to various technical journals, I am perfectly willing to back him up in all his facts against the theories of "O.J.F.S." and others.

From the last issue of *The Motor Cycle* I am sorry to see that "O.J.F.S." is becoming angry. I do agree in one thing with this gentleman, that it is "an advantage when writing on a subject to have something more than a theoretical knowledge of it"; but, at the same time, "O.J.F.S." should beware of that little knowledge which is such a dangerous thing.

In the third paragraph of his letter he mentions something about getting off the ground with the throttle half open. This, of course, has nothing to do with the point under consideration. Then he goes on to state that "one can make a perfectly good climbing turn on some machines without having full throttle." Granted. And for the very good reason that the power output of an aeroplane is well in excess of that required for horizontal flight alone.

May I suggest that "O.J.F.S.," who hints that he is a pilot, should carry out this little experiment?

Let him take a machine to a couple of thousand feet, or higher, according to the state of the atmosphere, so as to get away from ground "bumps" and then fly level *without touching the "joystick."* In order to do this he will probably find it necessary to throttle down. Should he be on a machine with a hand adjustable tail plane he can set it so as to fly level. When he is satisfied that the machine is really neither climbing nor dropping let him start turning (using the "joystick" and rudder, of course), not a half-turn, nor a complete turn, but a continued turn. After a time he will find from the altimeter that he *has* lost height.

Should "O.J.F.S." be a moderately good pilot I would then advise him to try a climbing turn on one of those machines he talks about, provided that he has the controls set (throttle or tail adjustment or both) so that the machine flies level without his hand on the "joystick." If he then finds that he can make a "perfectly good climbing turn" let him continue his climbing turn, and be prepared for a stall, or maybe a spin.

These simple practical experiments should convince him that an aeroplane *does* lose height on a turn if no extra power is provided.

Regarding the fourth paragraph in the letter, "O.J.F.S." introduces the question of turns on the glide. Here again he has failed to grasp the sense of Mr. Aston's remark, which refers to "flying normally in a straight line," not gliding. The extra power required for a turn on the glide is very simply provided by gravity.

Irrespective of the fact that an aeroplane does tend normally to lose height on a turn, I think that the whole argument about turning down wind, especially near the ground, arises from the fact that pupils at R.F.C. schools are (or were) not given a sufficiently lucid reason for the warning. This warning is given because beginners consciously or unconsciously judge their speed, if they are low down, from terrestrial objects. The change in speed *relative to the ground* when travelling down-wind from that observed when travelling up-wind appears excessive, and there is thus a tendency for the beginner to imagine that the speed has increased through the nose going down too much on the turn. He then pulls it up, although the machine may be, and probably is, flying at its correct attitude, and a stall results, with disastrous consequences.

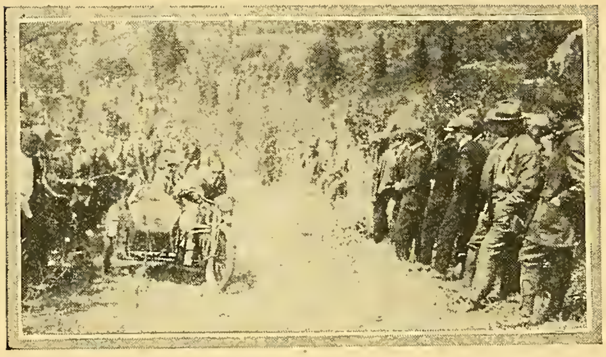
Perhaps, after all, "O.J.F.S." has all this time been laughing up his sleeve at the commotion his first letter caused. If so, I must congratulate him on the amusement he has given to so many of the R.F.C. PILOT.

Bristol.

AVERAGE SPEED IN U.S.A.

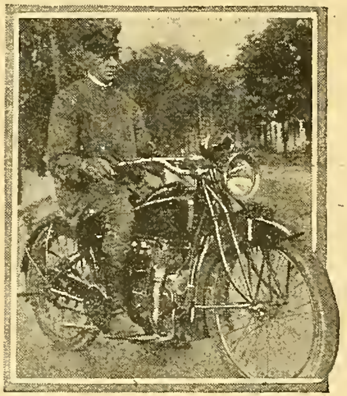
Sir,—Every so often we feel as how we just have to write you folks a letter, and this being one of them there now times, as it were, read the following. It may entertain; but, failing that, it will fill the page, so what's the odds?

It was sure laughable the way that average speed argument had everyone's goat a while back, the more so because it lets us know that you have lads over there who, when they straddle a motor bicycle and get a whiff of petrol in their nostrils, forget that there are sixty minutes to the hour and five thousand two hundred and eighty feet in a mile. We have a lot of 'em, too. Why a hombre had the nerve to tell us that he rode eight miles in eight minutes the other day on ordinary state highway! We merely asked him if he didn't stop for gas on the way and let him think he got away with it. Camouflage they call it now; but it's old stuff, the kinda bunk we'll always have with us, we 'spose. Why we rode ninety-three miles in three hours not long ago; but why brag about keeping out of gaol?



A scene at a hill-climbing competition at Newark, N.J., U.S.A.

Am sending you two photographs—one a scene at a hill-climbing competition last June, the other of a motor cycle policeman in our town. Since 1908, when three Reading-Standards were brought into the Department, we have had a motor cycle squad, and it has increased yearly. Yales, Excelsiors, and Harley-Davidsons have been used. The 1918 contract went to the latter make, and calls for twenty-eight machines—three-speed, of course, and electrically equipped. The men average from eight to twelve thousand miles yearly, and are on duty from 8 a.m. until 2 a.m. daily—that is, two shifts are.



A motor cycle policeman of Newark, N.J. His mount is an Excelsior.

The motor cycle police do traffic duty mainly, but assist in parades—riding solo and keeping crowds back being a regular job, take it from us. They are sent on special calls to outlying parts of the city, often arrive before the man on post can be located.

Besides the city force there are nine county police, who ride Indians, and maintain order in the park systems.

The motor cycle policeman may be found in many a small town as well, for it is a New Jersey State law that compels any officer to follow a speeder and compare the gait of the law violator with his speedometer. No speed traps, where a man is timed over a measured distance, will be permitted at all, the State law coming directly under the supervision of the Motor Vehicle Department.

E. B. HOLTON.

Newark, N.J., U.S.A.

EXHAUST POPPET VALVE DESIGN.

Sir,—May I reply to "D.L.E.," who criticises my remarks on De Lissa valves? I am very pleased to hear he has had no trouble with this valve. It at least bears out the well-known fact that identical engines do not always behave in the same way. I can assure "D.L.E." that the valves were most carefully ground in and that the timing was M.A.G. standard. Other timings were tried which, if anything, did behave worse. The compression in both cylinders was perfect. In fact, it was impossible to start without lifting the valves when using the kick-starter, and I think most of your readers will agree with me that there is not much wrong with the compression, and, incidentally, the valves in that case. "D.L.E." states that in his engine popping only occurs when the engine speed is too low for the load. Is he not confusing inlet valve blow-back with De Lissa valve popping? I never had a blow-back at all, but over 30 m.p.h. serious popping occurred, causing loss of power unless the air or spark were retarded. This was more pronounced with a Senspray carburetter than with an Amac. The only way to cure it was to increase the tension of the springs. This was most carefully done, and when the valves were closed it was possible to lift them easily about a sixteenth of an inch. When fully open it was impossible to move them at all, showing, to my mind, that the springs were too heavy—that is, the rate was too high. Weaker springs giving the same load at rest may have cured the popping without breaking the rocker arms. "D.L.E." states that the same size rockers are used in previous engines. Just so; I believe I remarked that there was bad design somewhere. Might I add to my criticism of exhaust poppet valve design of a previous issue that my remarks only referred to the illustrated examples, and only then because the air supply passages were totally insufficient.

Acton. OLIVOS.

FLYING IN A CURVED PATH.

Sir,—In your issue of December 13th, 1917, H. H. Groves, writing regarding flying in a wind, comes to certain conclusions, which are fallacies. I hope he will not mind my criticising his statements. He takes the conditions of a machine flying at 60 m.p.h. against a wind of 59 m.p.h., and states that if the machine be turned within its own length in order to fly down the wind the machine will have to be accelerated from 0 to 119 m.p.h., and that it will take time to produce this degree of acceleration. It will take time, but he infers that the time required for this acceleration will be greater than the time required to turn the machine when flying at the same speed in still air. For a given mass and accelerating force, acceleration is proportional to time. For a given mass and decelerating force, deceleration is proportional to time. If in a given time a given mass acted on by a given accelerating force has accelerated from 0 to 60 m.p.h., then in twice the time the acceleration will be double—that is, 120 m.p.h. If in a given time a given mass acted on by a given decelerating force is decelerated from 60 m.p.h. to 0 m.p.h., the same force acting in the same direction for twice the time will decelerate the mass from 60 m.p.h. to 0 m.p.h. in the first half of the time and accelerate the mass to 60 m.p.h. in the opposite direction in the second half of the time.

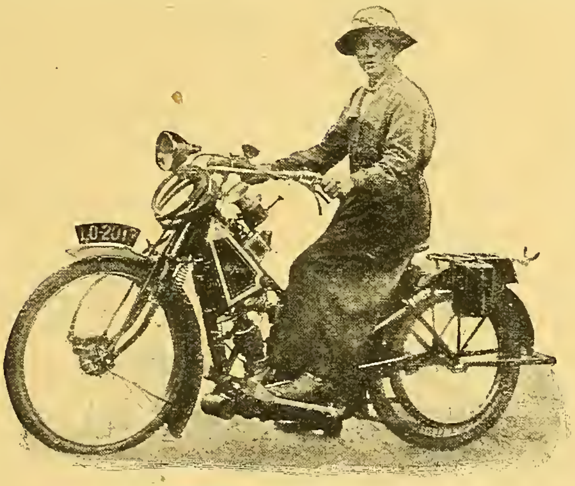
Take a different set of conditions—those of a machine flying at 60 m.p.h. in a wind of 60 m.p.h., and in a circle in the air of the same diameter as before. It will describe a semicircle in the air, but over the ground it will describe a volute curve such as a point on a wheel running on the road will describe in the air. The force producing the acceleration is obtained from the reaction of the air on the machine when banked for the turn, and is the same whether the machine is flying in still air or in a wind, provided the wind is steady.

With reference to the machine losing height while making the turn in a wind, it would lose the same height in still air. While flying level on a straight course the reaction of the air causes a resultant force acting vertically upwards equal to the weight of the plane. When flying in a curved path the centrifugal force is balanced by the reaction of the air. The weight of the machine and centrifugal force produce a resultant force acting outwards and downwards, balanced by reaction of the air. This resultant force, if plotted out, will be found to be greater than the weight of the machine. The plane is in effect thus more heavily loaded while turning, and for a given engine power developed must lose either horizontal speed or height as compared with its performance when flying straight and level. CHAS. WALMSLEY.

How a Lady Motor Cyclist's Knowledge of Machines was turned to Good Account.

WITH the passing of the erstwhile pleasure lady motor cyclist there has evolved a hardened and more practical rider, capable of strenuous effort and self-sacrificing patriotism. We shall always find a few mean individuals who evade the law, and, under the guise of national work, indulge in unnecessary riding, but these, we hope, are few. On the other hand, there are many who, with motoring experience gained most probably through joy rides before the war, are turning their knowledge to good account. Unknown and unostentatiously they "do their little bit" towards the stupendous whole that engages the attention of all worthy of the name of Britisher at this moment. One of these is the wife of Mr. T. Meeton, who carries on an extensive repair and garage business.

Before the war pleasure riding was the height of Mrs. Meeton's ambition. Learning to ride on a 7-9 h.p. Minerva some six years ago, she has since ridden almost all makes, and enthusiastically gives her vote of preference for a lightweight.


Mrs. T. Meeton on a 2½ h.p. O.K. Junior.

Lightweights Preferred.

A 2½ h.p., Mrs. Meeton thinks, gives all the necessary power for a lady riding solo. One feels master of a lighter machine, she says, and, although she is at home on a 7 h.p. Indian outfit, the speed and power are beyond modest requirements. An O.K. Junior, fitted with a M.A.G. engine, has given great satisfaction, and Mrs. Meeton is inclined to pin her fancy to this make. Her husband was a well-known figure in trials and competitions before the war, and his successes on a Rudge have materialised in a number of medals and a silver tea and coffee service given by the Surrey Motor Cycling Club in lieu of a number of awards. His wife has accompanied him as passenger in several contests, so the taste and sensations of speed are not unknown to her. Riding, however, at the present time has been supplanted by real hard work in the garage.

All vulcanising and tyre repairs are entrusted to her fingers. Taking engines down and decarbonising are now an open book to her. "Practice makes perfect," says an old adage, and this was never more true than in affairs motorish. A little knowledge is not always a dangerous thing.

Fitting New Covers.

Mrs. Meeton is fond of the work, and finds it interesting and not too hard, but the one job that she really dislikes is fitting new covers. Most of us know how stiff are the edges of heavy tyres, and how unyielding to any but the strongest fingers.

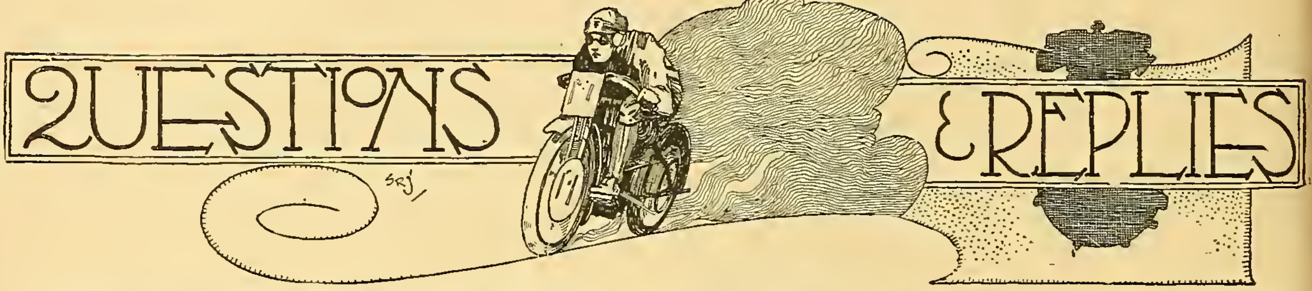
She has her own ideas as to a perfect ladies' mount, and is helping in her spare time to build a low frame around a Levis engine that her husband has purchased second-hand. The frame they have designed is very low, and neither really open nor diamond-shaped.

Mrs. Meeton is of small stature, and the machine is being built so that with ease she can reach the ground with both feet when astride. When I saw it the frame had been brazed, and was ready for the work with a file. Of course, the majority of motor cyclists do better to buy a machine direct from manufacturers who have long years in experience behind them, but still in the home-designed mount when successful the joy of parentage must add a good deal of pride to one's possession. Even a freak of one's own is preferable to the perfect machine of one's neighbour. Moreover, it is pleasant to find people of originality with sufficient enterprise to carry out their ideas.

A Projected Cycle Car.

Mr. Meeton has also obtained one of the few Buckingham engines, and when the war has ceased and the sun has set on the present insurmountable trade difficulties he will build round it a cycle car body in aluminium if his hopes be realised. The design is to be very similar to the Chota—a cycle car that is now obsolete.

MAY WALKER.



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Two-stroke Timing.

I recently purchased a two stroke. (1.) What is the right timing? (2.) What is the cause of blowing back in the carburetter? I can run for a few hundred yards, and then the blowing back occurs, until it almost stops the engine. (3.) What size jet do you recommend? The present one is No. 24.—L.W.

(1.) The best timing for a two-stroke is as follows: Variable spark—Place the piston exactly on top of the compression stroke and connect up the magneto, with the points just broken and the ignition lever fully retarded. This will mean that the force of the explosion, when the ignition is fully retarded, will begin when the piston has travelled about 1.5 mm. down the firing stroke. Fixed spark—If for a hilly country, set the piston $\frac{5}{16}$in. below the top of the compression stroke, and if for a flat country $\frac{7}{16}$in. from the top; when in these positions the points should be in the act of breaking. (2.) Probably the cause is due to too large or too small a jet. (3.) We should recommend you to try the size smaller than the present one, and afterwards a size larger.

Lighting Systems.

I have bought a 6 h.p. twin A.J.S., and intend taking it to Australia shortly. I am anxious to have the best possible lighting set obtainable at present. I shall be using the machine solo for a great part of the time. Please tell me the advantages and disadvantages of the following: (1.) Electric dynamo and battery set. (2.) Electric lamp on accumulator alone. (3.) Electric magneto set. (4.) Prestolite or any other acetylene cylinder set.—K.C.W.

(1.) The dynamo and battery system is the best for a cycle and sidecar. It is expensive, but if made by a good firm it is entirely satisfactory. (2.) This system is quite satisfactory, except that the accumulator has to be charged from time to time. (3.) The magneto system is fairly good, but does not give so powerful a light as a proper dynamo installation. (4.) This is quite a satisfactory installation, but, so far as England is concerned, needs further development in the direction of motor cycles, as the cylinders are large and unwieldy. The actual Prestolite cylinder is not obtainable in this country, but it is possible you would be able to get it in Australia. If not, the set would be of no use to you.

Taking Machine Home.

Having purchased a motor cycle last October, I had to leave it in a garage for repair. Now the job is completed, I want to know if it would be an offence to drive the machine from the garage to my residence with petrol purchased with the machine?—J.B.

Technically you will be acting illegally in driving your machine from your garage to your house, but we do not think any bench of magistrates would convict under the circumstances. You might write to the Petrol Controller, who would in all probability grant you a special permit for the use of the machine on this occasion.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week

Stresses due to Passenger Carrying.

Which places the greater stress upon the engine whilst in motion (not initial stress upon starting)—a 12 st. man riding on the carrier or a 12 st. man in a properly sprung sidecar?—A.E.B.

As regards the actual stress due to the weight of the man, we do not think there would be much to choose between his weight on the carrier and his weight in the sidecar. On the other hand, his presence in the sidecar would very much increase wind resistance, and the sidecar alone (*i.e.*, empty) would exercise a much bigger drag on the machine than would the man on the carrier. Consequently, the more economical way of carrying a passenger would be on the carrier, but the difference resulting from the two alternative positions would be a difference due, not so much to the different position of the man's weight, but to the actual means employed for carrying him as a sidecar passenger. These remarks apply primarily to travelling on the level.

Unsatisfactory Deal at Auction Sale.

On the 20th of October, 1917, I bought in the local auction mart, sold by the auctioneer, a $3\frac{3}{4}$ h.p. solo motor cycle, guaranteed as a 1913 model in running order. I sent the engine and frame numbers to the makers, and they have informed me that the cycle was sent out from their works on March 30th, 1912. I informed the auctioneer, and he advised me to sell the cycle by auction as a 1912 model, and whatever it made less than £26—the price I paid for it—I could claim from the party that sold it as a 1913 model. I should be obliged if you could advise me.—G.M.

The advice the auctioneer has given you is quite sound. On the other hand, you could return the machine and demand back your money. We should advise you to settle the matter out of court if you possibly can.

Use of Petrol issued for Volunteer Work.

I shall be greatly obliged if you will kindly inform me how I stand as regards the use of petrol. I wrote to the Petrol Committee asking if it would renew my licence, stating I was a member of the local Motor Transport Volunteer Corps, and only used my machine for that purpose. The committee granted me a licence for twelve gallons, expiring on March 31st next. Am I allowed to take my wife for an occasional run in the sidecar; also, am I allowed to use my machine only on parade? Some people inform me the petrol is for tuning up purposes. As the machine is garaged in a damp place I should be pleased if allowed to take it out occasionally.—A.G.

If you have been granted petrol solely for use as a member of the local Motor Transport Volunteer Corps, you must not use this petrol for any other purpose whatever, unless the Commandant of the corps will give you an order so that you may say you are tuning the machine to prepare it for duty with the corps, and that, consequently, such tuning is on corps duty.

Petrol Licences for Soldiers on Leave.

Is there any likelihood of a private soldier being granted a short time petrol licence, whether on leave from the Front, wounded, or convalescent?—L.S.

There is just as much chance for a private soldier to obtain a short time petrol licence as there is for an officer, and if you write to the Petrol Controller your application will be considered, but you will understand that we cannot say definitely whether it will be granted or not. If possible, personal application at the Controller's office should be made.

Cracked Exhaust Valve Seating.

When overhauling my 1914 6-8 h.p. Rex, chain drive, I discovered that the front cylinder was cracked across from the exhaust valve seat to the inlet valve seat. Will you please tell me: (1.) Can it be successfully welded up? (2.) The tank is fitted with an Enots drip feed for the oil, but I cannot get the oil to drip. When I pull up the plunger of the pump the oil comes straight through the sight feed, even with the valve screwed in tightly. Please explain the cause. (3.) The clutch is a cork inset type. Should the insets and plate be free of all oil and grease?—F.W.

(1.) Yes, such a crack can be quite satisfactorily welded. (2.) Evidently the valve of the drip feed is not seating properly. It should be removed and entirely dismantled, and all parts examined to see if anything is preventing the valve from seating when it is screwed right up. (3.) Yes, it is advisable to see if the clutch is free from grease. It is unnecessary to lubricate a clutch of this kind.

Free of Duty Petrol.

I am using a 7-9 h.p. Indian and sidecarrier with my name, address, and business printed on it in 2in. letters both back and front, and the machine is used for business purposes only. The petrol granted me for the use of this machine and a Wall tricar, with a commercial box body, has been thirty-six gallons a month, duty free since August 1st, 1916. Since my last application for the renewal of this licence the committee say "that as some of this petrol has been used in the Indian I have infringed the Order, as they consider that it is liable for the licence duty, and therefore request the sum of £2 1s. 6d. for the extra 6d. per gallon duty on the petrol." Unfortunately, I paid the licence duty of £1 during the year. Is the Indian liable for the licence duty?—J.T.

We consider that the Petrol Controller's Department is quite in error. The fact that the machine has a sidecarrier and is constructed for the conveyance of goods and merchandise renders it exempt from payment of the local taxation licence; but we are afraid you have rendered yourself liable through having paid this tax, as no free-of-duty petrol is granted for use on a vehicle on which the local taxation licence duty has been paid. Therefore, we fear you have no alternative but to remit the amount demanded.

Back Firing.

I have a 6 h.p. three-speed A.J.S. with sidecar. It has just lately taken to backfiring when started up by means of the kick-starter, acting the same way whether the engine is cold or hot. It does not always do it, and altering the magneto so as to retard it does not make any difference whatever. I do not know if the magneto itself has slipped at all, but I had an accident the other day and ran the machine on to the grass by the side of the road, and eventually landed in the ditch. The machine apparently had not received any damage, but the magneto may have slipped on its bed, though the engine did not backfire when I started up after the accident. Another thing that puzzles me is the oil feed. If while the engine is running I turn down the little tap on the pipe leading from the oil tank to the pump, the pump handle is forced upwards from the barrel, and then it is possible by forcing it down to give the engine oil; but if I then turn the tap off, the pump does not recharge itself, nor is it possible to pull up the handle. The only way to recharge the pump is to turn the tap down. Is not the engine then sucking the oil straight from the tank as fast as possible? What I have been doing so far is to turn the tap down until the pump is full, then turn it off again until I want to give the engine oil, when I once more turn the tap down, force the plunger down, then let it get slowly refilled, and then turn the tap off again in order to prevent the tank getting drained. Is this how it should work?—E.A.B.

You should check your magneto timing. If the magneto was moved slightly by the accident to which you refer the only way in which the timing could be effected would be by the slacking of the chain, which would retard the ignition. This would have the opposite effect to causing backfiring, unless by backfiring you mean popping in the silencer. We rather imagine you mean that the engine kicks back, which is most probably caused by an excess of carbon deposit. As regards lubrication, all you have to do is to turn the tap down and force down the plunger, say, every five miles. You need not touch the tap again until you have finished with the machine for the day, when it should be turned off so as to preclude any possibility of leakage. If you desire at any time for the oil supply to cease while you are running, push down the handle on the pump and lock it with the device provided for that purpose.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

Aluminium Cylinders.

(1.) Could you tell me if the 3½ h.p. Norton with three-speed countershaft gear and kick-starter could do 60 or 70 m.p.h. if tuned up for speed? (2.) Would an aluminium cylinder fitted to a Norton be satisfactory for speed work? (3.) Do you think I would get any better results than with an iron cylinder?—G.R.M.

(1.) Yes; we should say that the machine should attain this speed if properly tuned up. (2.) We should say so; but we have had no practical experience with this type of cylinder at the present time. (3.) Theoretically, an aluminium cylinder should be more efficient than a cast iron cylinder on account of the better cooling properties of the metal.

READER'S REPLY.

Hub Gear Kick Starter Trouble.

I see in the issue of 20th December a query from "A.R." *re* kick starter of a Mark VI. Armstrong hub slipping. I have just had the same experience, so am forwarding the result, in the hope that it may be of use to your correspondent. My 'bus is a 2¾ h.p. Humber with Armstrong Mark VI. three-speed hub and clutch. I had thoroughly overhauled the gear and replaced it, when I found, just as "A.R." did, that the pedals would turn the engine slowly, but as soon as I pedalled hard to start the engine they slipped. I knew the free-wheel gear was all right, so I had a look at the controls, and found that the elbow piece at the end of the axle was screwed up one turn too much, thus preventing the top gear from engaging fully. This was the sole cause of the trouble, and, I think, of your correspondent's also. I shall be glad if this solves the difficulty, as I have had many useful hints from the pages of *The Motor Cycle*. Congratulations in passing on your attitude *re* "Goods Made in Germany." Hope your publisher did not swoon away when he heard that Mr. Chas. S. Ives had countermanded his order!—G.H.R.C.

RECOMMENDED ROUTES.

LIVERPOOL TO YARMOUTH.—C.A.T.

Liverpool, Warrington, Knutsford, Macclesfield, Leek, Ashbourne, Derby, Nottingham, Grantham, Stamford, Wansford, Peterborough, Wisbech, Downham Market, Swaffham, Dereham, Norwich, Acle, Yarmouth.

IPSWICH TO LEEDS.—B.B.

Ipswich, Needham Market, Stowmarket, Ixworth, Thetford, Mundford, Stoke Ferry, King's Lynn, Long Sutton, Swineshead, Sleaford, Newark, Tuxford, East Retford, Doncaster, Wakefield, Leeds. Approximately 180 miles.

BIRMINGHAM TO NEWCASTLE.—A.H.

Birmingham, Sutton Coldfield, Tamworth, Ashby-de-la-Zouch, Castle Donington, Nottingham, Mansfield, Worksop, Tickhill, Doncaster, Ferrybridge, Aberford, Wetherby, Boroughbridge, Northallerton, Darlington, Neville's Cross, Chester-le-Street, Newcastle. Approximately 200 miles.

The Military Norton.

We have been requested to state by the Norton Motor Co. that military model Nortons cannot be purchased without a Government permit.

Motor Trades Debating Society.

In consequence of many of the members being engaged on National Service and the early prospect of rationing, the committee has reluctantly decided not to hold a session this season.

Soldering Aluminium.

We have received a small aluminium box which has been soldered with ordinary solder by means of a special flux invented by H. C. Procter, of Levenshulme, Manchester, who assures us that this flux enables aluminium to be soldered to copper or other metals.

Spring Terminals.

A neat terminal which readily snaps into the neck of the milled nuts fitted to all Forward plugs is now marketed at one shilling per set of four. By its aid the high-tension cable is easily and quickly fixed, and the time spent in removing or fixing the milled nut is saved.

Waterproofs.

Burberrys are organising their New Year's sale from January 1st to February 28th. We have received their lists, and note that there are some excellent bargains in the well-known Burberry motoring garments, both for ladies and gentlemen. These sale lists, which contain full particulars, prices, and measurement forms, may be had on application from Burberrys, Haymarket, London, S.W.1.

A New Zealand Firm.

Our readers will remember previous references to Mr. J. B. Clarkson, who has often visited this country in the interests of the Oversea motor cycle business. The title of his firm is now Hope, Gibbons, Sons, and J. B. Clarkson, Ltd., Wellington, New Zealand.

This firm has decided to open an office in Sydney, Australia, in order better to look after the interests of the manufacturers whom they represent in that district.

A Carburetter Booklet.

Messrs. Brown and Barlow, Ltd., of Witton, Birmingham, have recently issued an entirely new edition of their handbook on motor cycle carburetters, and this edition surpasses all the firm's previous efforts in this direction. Readers may recollect that we reviewed rather fully a previous edition of this handy little booklet, and commended the hints and tips contained therein to the careful perusal of all motor cyclists, whether riders of baby two-strokes or of big twins. What the writer of this little book does not know about carburation in all its branches is hardly worth knowing, and the new edition has not been written merely for the sake of exercising his pen. It contains much new information, and may be had for the asking. The booklet is attractively got up, and, besides the information capable of general application, contains full illustrations of all types of B. and B. carburetters and their component parts.

SPARKLETS

New Tyre Depot.

We are informed that Palmer Tyre, Ltd., have moved their premises in Birmingham to Broad Street Chambers, where are installed their new showrooms, depot, and offices. All local enquiries should now be sent to this address.

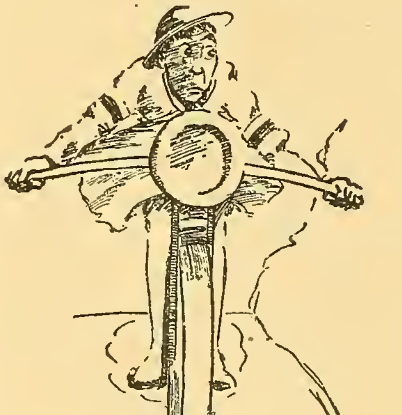
Insufficient Address.

Messrs. F.R.S. Lamps, Ltd., 7-9, Pershore Street, Birmingham, inform us that they are constantly receiving letters from members of our forces, both at home and abroad, which give an insufficient address. They state: "We do not know why this omission should be so general to khaki, but it is."

Review.

An attractive little book, tastefully illustrated and well written, describing the history of the Eagle and British Dominions Insurance Co. from its foundation, "Links with the Past" is well worth reading, giving as it does the history of insurance from the very earliest days down to the present time, when the latest and most recent form of insurance is that applied to motor vehicles.

The mechanically minded will find the chapter on fire engines interesting, as it deals with the old system of extinguishing fires by means of buckets down to the manual machine, and finally to the petrol-driven fire engine with which the L.C.C. Brigade is now equipped.



A humorous Christmas card received by the Editor. It is briefly inscribed—"From 'O' Corps, D.R.'s, B.E.F."

1918 Calendars.

Messrs. Prices' Co., Ltd., Battersea, London, S.W., the well-known lubricating oil manufacturers, have sent us some specimens of their 1918 pocket calendars, which are tastefully printed and delicately perfumed. They are of a very convenient size for carrying in a purse or pocket book.

Changes at Dunlops.

The Dunlop Rubber Co., Ltd., announce the undermentioned rearrangements in *personnel:* Mr. L. M. Bergin relinquishes the position of general manager and becomes managing director; Capt. George DuCros becomes general manager, with a seat on the board; Mr. A. H. Huet, late superintendent of depôts, becomes assistant general manager, Mr. W. H. Paull development superintendent, and Mr. E. H. Blake sales manager.

The Cygnet Rear Car Co.

We have already described and illustrated the Cygnet rear car, and we are now informed that, owing to the success of this contrivance, a new company has been formed for its manufacture under the title of "The Cygnet Mfg. Co., Inc." The offices and works of this new concern are still at 1200, Niagara Street, Buffalo, N.Y.

We are informed that these rear cars are being put to a fair number of military uses, and we must confess to being somewhat surprised at the information. The company itself is surprised at the success of its "limousine model."

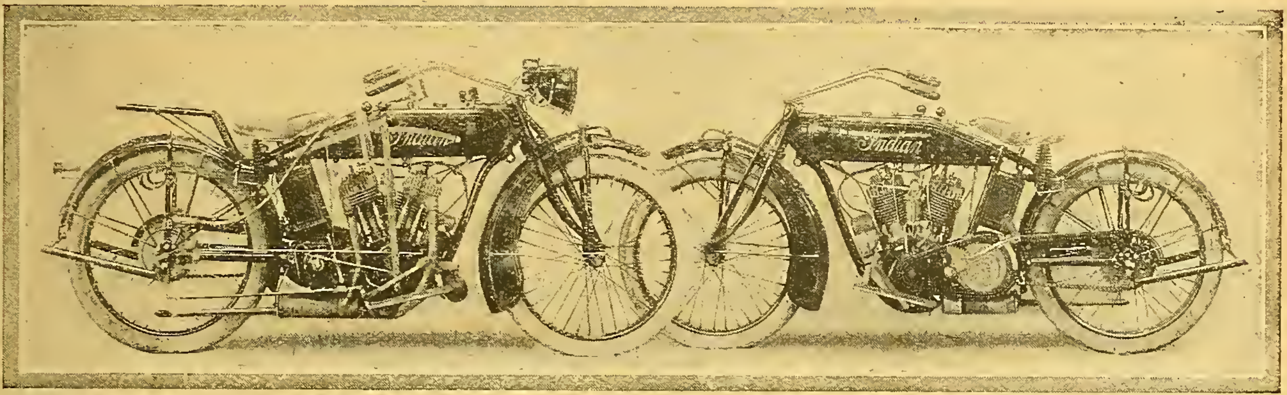
Hints on Repainting Motor Cycles.

At the present time, when it is so difficult to get work of all kinds accomplished, some hints on re-enamelling motor cycle frames and sidecar bodies will undoubtedly be welcomed by our readers. Messrs. Jenson and Nicholson, varnish and japan manufacturers, Goswell Road, Stratford, London, E.15, have issued leaflets giving instructions on cycle enamelling and also the enamelling of car bodies, both of which will be of valuable assistance to our readers in renovating their motor cycle frames and wheels and also their sidecar bodies.

People are prone to think that painting is an extremely simple matter, and that merely applying the paint with a brush will effect good results. This, however, is not so, and it is most essential that the article to be painted should be scrupulously clean. Secondly, the art of laying on the paint is not easy to acquire. The mere dabbing on of the paint with the brush will not produce the very best effects. The great art in painting is to apply as little as possible, and, to use a painter's term, work the brush right out. This is done by dipping the brush a little way into the paint and quickly laying it on the article roughly until the brush ceases to leave any mark. When the surface to be painted has been treated in this manner all over, it requires "laying-off," which means working the brush the whole length of the surface in perfectly straight lines until the part treated appears perfectly smooth and even. The paint will then dry evenly.

With Robbialac it is possible to get a surface almost as good as stove-enamelling, but it requires patience and care in use.

1918 Powerplus *Indian* Motocycles



Which we trust will be Post-War Models.

We regret that we are not in a position to supply motorcycles or send out catalogues at the present time, but when we are able to do so we will freely advertise the fact. This applies to Great Britain only.

"Indian Motocycle" Hendee Manufacturing Co.

HENDEE MANUFACTURING CO.,
"Indian House," 366-368, Euston Road, London, N.W.
Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA, 109-113, Russell St., Melbourne.
CANADIAN WORKS, 12-14, Mercer St., Toronto.
AFRICA, Indian House, 127-9, Commissioner Street, Johannesburg.
Indian House, 579, West Street, Durban.
Indian House, Strand Street, Port Elizabeth.

Norton

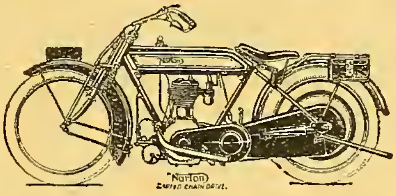
POWER

Norton
EFFICIENCY

Norton
FLEXIBILITY

Norton
RELIABILITY

NORTON MOTORS, BIRMINGHAM.



SUPERIORITY

BARTLETT, GT. PORTLAND ST., LONDON.

Norton
SIMPLICITY

OVERSEAS

OWING to the factory being engaged on Government work, we are still unable to supply for civil requirements, but it would pay you to keep in touch with us. Let us record your address for new list when ready.

Our post-war programme provides for a New Colonial and Sidecar 6 h.p. Twin Model with spring frame. Also Overseas Engines and Complete Sets of Fittings for the Home and Export Trade.

THE OVERSEAS MOTOR CO., LTD., 1a, Johnstone Street, Ladywood, BIRMINGHAM.

Hazlewoods
LTD COVENTRY.

We are busily engaged in munitions, but, as soon as things in Europe are put right, we hope to fulfil our obligations to our numerous clients. Meanwhile, write and have your name booked for earliest possible delivery.

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns —First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

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Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

Abingdon.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1914 Abingdon King Dick, 4h.p., 3-speed, Philipson; 24 gns. (D) [2677

A.J.S.

A.J.S. Spres; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

A.J.S. Combination in stock, W.D. model, complete, £111/12/6; solo, 6h.p., £91/6.—Cross, Agent, Rotherham. [X0471

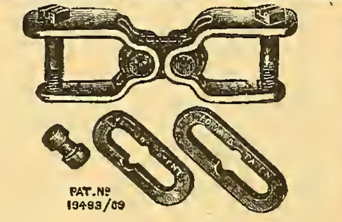
A.J.S., 6h.p., and sidecar, one of the last 1915 models turned out; price only 75 gns.—Julians, 84, Broad St., Reading. 'Phone: 1024. [0931

A.J.S., latest 2¾h.p. model, 3 speeds, kick start, hand clutch, original tyres still on, unscratched; £45.—Buntings, Masons Av., Harrow. [2584

A.J.S. Motor Cycles.—Immediate delivery of the very latest 6h.p. models from stock. — The A.J.S. Specialists, The Walsall Garage, Walsall. Tel.: 444. [X9872

1917 A.J.S., 2¾h.p., 2-speed, ridden 900 miles, £40, complete, cost £62; also boy's push cycle, £4/10, and lady's carrier cycle £4/10.—Turley, 32, High St., Rusthall, Kent. [2611

A.J.S. Motor Cycles; immediate delivery of special 1917 model, complete, detachable wheels, 700×80 tyres; £91/6.—P. J. Evans, 87-91, John Bright St. Sole agent for Birmingham and district. [2352



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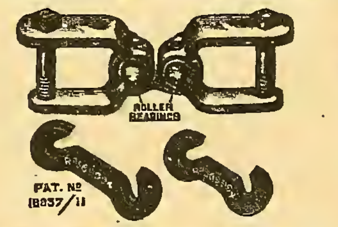

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MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S., late 1913, 6h.p., and Swan sidecar, speedometer, lamps (electric); £60; perfect condition.—Boyce, 27, Turnpike Lane, Hornsey. [2581

A.J.S., 1914, 2-speed, clutch, and K.S., all-chain drive, £37/15; 1913 model, £35; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X0491

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—A.J.S., 1916 6h.p. De Luxe combination, hood, screen, spare wheel; 97 gns. (D) [2644

A.J.S. 1916 Coachbuilt Combination, twin, mag., 3 speeds, countershaft, kick, speedometer, lamps; greatest bargain ever known; 65 gns. — Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). [2612

PLEASE Note, we can deliver the latest 6h.p. A.J.S. model from stock, price £91/16; also several other new machines from stock; please send for our lists.—The North Wales Motor Exchange, Chester St., Wrexham. [X9884

6h.p. A.J.S., very latest model, Service finish, 28in. wheels, new from works October last, not done 1,000 miles, and just run in, Mills-Fulford Corvette sidecar, hood, Ward and Goldstone accumulator lighting set, Bonniksen £5/10 speedometer, outfit cost over £122; complete and perfect in every respect; £105.—Batten, Fieldgate Close, Kenilworth. [X0307

1916 4h.p. A.J.S., makers' No. 8,060, with A.J.S. coach sidecar, wind screen, luggage grid, lock-up toolbox, storm apron, spare wheel and new tyre, 2 Lucas lamp sets, Lucas horn, Watford trip speedometer, many spares, mechanically perfect, hardly used, brand new appearance; £105.—Robinson's Garage, Green St., Cambridge. [2605

Alldays.

ALLON, 2-speed, £29/10; also all new models; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0493

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1916 Allon, 2-speed, 2-stroke; 27 gns. (D) [2645

ALLDAYS Allon, 1917, nearly new, excellent condition, 2-speed; £35, or nearest offer.—Whittall, 6, Clifton Gardens, Folkestone. [2522

ALLDAYS Matchless, 1914, 3½h.p., 3-speed, clutch, kick start, chain drive, C.B. sidecar; cash £28.—Liley, 30, Benson St., Liverpool. [X0444

1917 Alldays Allon, 2¾h.p., 2-stroke, 2-speed, lamp, horn, tools, very little used, guaranteed as new; £37/10.—Harrison, 110, Melville St., Burnley. [X0402

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-speed countershaft models in stock. [1048

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1913 Ariel, T.T., 3½h.p.; 22 gns. (D) [2646

ARIEL, 5-6h.p., 3-speed and clutch, C.B. sidecar, hood, screen, Lucas lamps, Cowey speedometer; £64; E.P. or exchange; all new models supplied.—Service Co., 292, High Holborn, W.C.1. [X0488

Auto-Wheels.

WALL Auto-Wheel, first-class condition; £10.—Clifford's Garage, Sidcup. 'Phone: 4. [2632

Bat.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1911 Bat-Jap, 6h.p., 2-speed, sidecar; 21 gns. (D) [2679

Blumfield.

BLUMFIELD, 1916, 3½h.p., special ball bearing engine, E.I.C., Senspray, enamelled red, fast, sporting, not done 800 miles; must sell; £28, or offer.—Write, F. Shine, 6, Cross Rd., Wimbledon. [2534

Bradbury.

BRADBURY 4h.p., 3-speed; £25; E.P. or exchange. —The Service Co., 292, High Holborn, W.C.1. [X0505

4h.p. Bradbury, 2-speed, clutch, accessories, well tyred, splendid order; £28.—Vining, Croscombe, Wells, Somerset. [2552

4h.p. Bradbury Combination, complete, £35, or part exchange 7-9h.p. countershaft Indian combination.—Davies, Wendros, Boncath, Pem. [0419

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1914 Bradbury, 4h.p., 2-speed countershaft, 29 gns.; 1913 Bradbury, N.S.U. 2-speed, 21 gns. (D) [2648

Brown.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1911 Brown, 3½h.p., mag.; 11 gns. (D) [2647

B.S.A.

1915 B.S.A. 4¼h.p. Combination, complete, all chain drive, perfect; £50.—Cadman, 25, Cornwall Rd., Bayswater, W.11. [2589

1916 B.S.A. Combination, chain-cum-belt, 3 lamps, speedometer, horn, tools, perfect condition, mileage 4,000; appointment; £55.—135, Essex Rd., Leyton, E.10. [2569

MOTOR CYCLES FOR SALE.

B.S.A.

B.S.A., 1916 model K, Canoelet sidecar, with apron, lamps, and accessories, perfect order; sacrifice £50. —Extractor Silencer Co., Cambridge. [X0481

B.S.A., 4¼h.p., 1916, chain-cum-belt, and sidecar, good as new, only just run in; take £50 for quick sale.—38, Kashgar Rd., Plumstead, S.E.18. [2521

1916 B.S.A., 4¼h.p., chain, 3-speed, countershaft, horn, Lucas lamp, new back Dunlop, perfect condition; 48 gns.—Gubbin, Bude, Cornwall. [2591

B.S.A., 3½h.p., free engine, clutch, Dunlop tyres, one new, will start on half paraffin, lamps, horn, and some spares, good condition; £30.—Green, Ladysmith Rd., Enfield. [2590

B.S.A. Late 1913 Combination, roomy coachbuilt sidecar, splendid condition, tyres and belt as new, head and rear light, speedometer, new Rich endless tube, other spares; £45, or close offer.—Studley, Birch. near Colchester, Essex. [X0418

I.O.M. B.S.A., actual 1914 T.T. machine, 3-speed countershaft, 3 brakes, foot oil pump, 2¼ gallon tank, good tyres and belt, new Brooks saddle, mechanical horn, very fast sporting mount; £48/10.—Davan, 3, Courtlands Av., Lee, S.E. [2523

1916 B.S.A. Canoelet Combination, chain drive, 3-speed, clutch, complete with lamps, Stewart speedometer, 2 Lucas generators, leg guards, as new; best offer accepted; no exchanges; seen by appointment.—S. Toogood, Military Hospital, Lewisham. [X0423

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1917 B.S.A., special sidecar, brand new, 86 gns.; 1915 B.S.A., all chain, coach sidecar, hood, screen, 49 gns.; 1913 B.S.A., 3½h.p., 2-speed, 26 gns.; 1916 B.S.A. combination, 59 gns. (D) [2649

Chater-Lea-Jap.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1914 Chater-Lea-Jap, N.S.U. 2-speed gear; 22 gns. (D) [2656

EARLY 1915 Chater-Lea, J.A.P. 5h.p., excellent condition, 2-speed gear, coachbuilt sidecar, lamps, and accessories; £30, or nearest.—105, London Rd., Calne, Wilts. [2524

Clyno.

CLYNO 1913-14 Combination, 5-6h.p., 3-speed, spare wheel, lamp set, Cowey speedometer, horn, etc., price £59/10; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0501

Diamond.

LATE 1915 Diamond, 2¾h.p., 2-stroke Villiers, Lucas lamps, horn, new back Dunlop tyre, just been thoroughly overhauled, splendid condition; bargain, £22; after 7 any evening.—Morris, 13, Claudius Mansions, Rothbury Rd., Victoria Park, E.9. [2527

Coventry Eagle.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Coventry Eagle, 1916, 2-stroke, 2-speed; 27 gns. (D) [2650

Crescent.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Crescent, 1917, 2-stroke, 2-speed, as new; 26 gns. (D) [2666

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

1912 2-speed Douglas, perfect order, splendid condition; first £20 gets bargain.—Box 1,556, c/o *The Motor Cycle.* [X0459

DOUGLAS 1915 Combination, 4h.p., 3 speeds, clutch, kick starter, many others.—Griffin's, 89, Gt. Portland St., W.1. [2529

DOUGLAS W.O. 4h.p. Combination, 1916, lamps, horn, speedometer; £65.—Bunting's Motor Exchange, Harrow. [2585

DOUGLAS, 1913, 2-speed, overhauled December, speedometer, fast, perfect; bargain, £28.—Campbell, Buntingford. [X0439

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat. Yeovil. Tel.: 50. [5855

DOUGLAS, 2¾h.p., late 1914, only used summer months, all accessories, splendid condition; £33.—Winchurch, Chipping Norton. [X0427

DOUGLAS, 2-speed, good condition, mechanical horn, and speedometer; £24.—Blake, Portland Court Garage, Gt. Portland St., W.1. [2617

DOUGLAS, 2¾h.p., late 1914, 2-speed, lamps, horn, excellent condition, thoroughly reliable; £30.—Nixon, Brampton, Cumberland. [X0485

DOUGLAS.—Prompt delivery of new 1918 models to farmers, doctors, etc., against Ministry of Munitions Permit.—Motor Exchange, Horton St., Halifax. [2559

DOUGLAS, 1913, 2-speed, Bosch mag., £32/10; 1911 2¾h.p., with lamp and tools, £12/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0452

1912 Douglas, 2¾h.p., 2 speeds, free engine, clutch, overhauled, new tyre and belt, lamps, speedometer; £16, real bargain.—C/o 9, Australia Rd., Slough. [2593

DOUGLAS, 1915, 2¾h.p., 2-speed, enamel, plating, and tyres as new, in good running order; £34.—By letter only, S. Newbold, 30, Melrose Rd., London, S.W.18. [2567

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Front Wheels, complete, 26×2½, with hollow spindles	22/6
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2½ h.p. J.A.P. pattern	„	2/3
4-6-8 h.p. J.A.P. pattern	„	2/8
90m.m. J.A.P., genuine	„	2/11
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MOTOR CYCLES FOR SALE.

Douglas.

1913 Douglas, 2 speeds, clutch, kick start, indistinguishable from new, Binks, 2¼ tyres, fully equipped; £27, no offers.—Motorist, 121, Acton Lane, Chiswick, London, W. [2610

DOUGLAS Motor Cycles.—We can deliver 1917 Model W on receipt of permit.—Eli Clark, the Bristol Douglas agent, 223 Cheltenham Rd., Bristol. (Wholesale and retail.) [0923

DOUGLAS, 2¾h.p., 1914 model, 2-speed, T.T. bars, head lamp, rear lamp, Stewart speedometer, horn, perfect condition throughout, good tyres, fully equipped, very fast; £38/10.—Mebes and Mebes, 156, Gt Portland St., W.1. [2629

2¾h.p Douglas, delivered from works December 23rd, 1914, perfect order, unused 12 months, many extras, accept best offer over £30; also lady's 1913 model, perfect, £32; these two machines are bargains, and privatel owned.—Lieut Hensley, Highland Grove, Worksop. [X0469

DOUGLAS, 1914, 2¾h.p. T.T. Model, long exhaust pipe, new 2½in. Dunlop on back, spares, full kit, including cover and tube, Lucas lamps and generator, perfect condition, as new, only used four months since new; bargain, 30 gns.; seen in London.—Douglas, The Box, Hampton-on-Thames. [2570

1917 2¾h.p. Douglas, Model W, hand-controlled clutch, kick start, latest improvements, £54, plus 20%; also Models U and V, 1916 specification, £50, plus 10%, absolutely new; immediate delivery against priority permits for doctors, farmers, war and munition workers; how and where to apply.—Full particulars, write, Douglas Specialists, Robinson's Garage, Green St., Cambridge. [2603

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Douglas, 1916, 4h.p., T.T., 3-speed, unscratched, 59 gns.; Douglas, 1917, 4h.p., 3-speed, 20 gn. sidecar, hood, screen, mileage 500, 89 gns.; 1915 Douglas, 2¾h.p., 3-speed, 37 gns.; 1914 Douglas, 2-speed, 2¾h.p., 32 gns.; Douglas engine and other parts in stock.—'Phone: Hampstead 4904 and 5392. (D) [2643

Enfield.

ENFIELD 3½h.p., run 200 miles; 45 gns.—Clifford's Garage, Sidcup 'Phone: 4. [2630

ENFIELD 3h.p. Twin, 2-speed, 1913; £20.—5, Rainham Rd., Kensal Green, N.W.10. [2544

ENFIELD 1916 6h.p. Combination, like new, hood, screen; £58.—29, St. Leonard's St., Bow. [2601

ENFIELD 1914 6h.p. Combination, special racing engine, tools; bargain, £50.—92, Bellevue, Shrewsbury. [2580

ENFIELD, 3h.p. twin, 1916 model, practically equal to new 39 gns.—Julians, 84, Broad St., Reading. 'Phone: 1024. [0928

6h.p. Twin Enfield and coachbuilt sidecar, only run 100 miles; £75.—Mansell, 26, Portman Mews North, Portman Sq., London. [2575

ENFIELD Combination, 1917, 6h.p., 3 Lucas lamps, horn, wind screen, special mudguard, luggage grid; £90.—Jones, Garage, Droitwich. [X0247

ROYAL Enfield, 2¼h.p., 2-speed, new July, 1917, head and rear lamps, tools; £42.—Chambers, 28, Lavenham Rd., Southfields, S.W.18. [2547

ENFIELD, 1912. 2¾h.p. twin, 2-speed countershaft, all-chain drive, Binks carburetter, Bosch mag.; £15, or offer.—8, Azenby Rd., Peckham. [2556

ENFIELD 1914 6h.p. Combination, splendid condition, tyres as new, speedometer, all accessories; £45, no offers.—Ketley, Alpha St., Slough. [2536

ENFIELD 6h.p. Combination, 1915-16, only done 400 miles, perfect condition, every accessory; fullest trial; 75 gns.—Wright, Sanacre, Parkstone, Bournemouth. [X0385

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; 1915 6h.p. combination, £76; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X0492

1915 Enfield, 3h.p. twin, new footboards, 2 speeds, T.T., extractor silencer, mechanical oiling, perfect running order, absolutely a fine tool; £30.—Extractor Silencer Co., Cambridge. [X0483

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1917 Enfield 8h.p. combination, 79 gns.; 1916 Enfield 6h.p. combination, 77 gns.; 1915 3h.p. Enfield, 2-speed, 33 gns. (D) [2651

1917 3h.p. Enfield, as new, lamps, horn, speedometer, guaranteed perfect; £55, or will exchange for good 4h.p. Triumph, Norton, or 4h.p. Douglas, cash adjustment.—Glenn, Garage, Uppingham. [2538

ENFIELD Combination, 6h.p., 1913, new tyres, new front and back lamps, sidecar lamp, engines just overhauled, speedometer, in perfect condition; accept best offer; can be seen at any time.—L. Cura, Bath Court, Warner St., Clerkenwell Rd., London, E.C.1. [2602

Excelsior.

EXCELSIOR, 2¾h.p., 2-stroke, 2-speed, and clutch, 1915, speedometer; a real bargain, £16.—Box L5,348, c/o *The Motor Cycle.* [2622

F.N.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1913 F.N., 5-6h.p., 2-speed, clutch, 23 gns.; 1912 F.N., 2½h.p., 2-speed, 12 gns.; 7-9h.p. F.N., 3-speed countershaft, clutch, kick start, underslung coach sidecar, latest model, 62 gns (D) [2652

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

F.N.

1912 F.N., 2½h.p., 2 speeds, countershaft, re-enamelled and replated, Bosch, B.B., new tank, good tyres, complete, but wants assembling and slight repair to engine; bargain, or with cash for twin.—Claessens, 416, Richmond Rd., 1st Floor, Twickenham. [2520

Harley-Davidson.

HARLEY-DAVIDSON Combination, 1914, Mills-Fulford sidecar, perfect condition; £50.—Willavise, 10, Crewys Rd., Child's Hill, N.W. [2550

LATE 1915 Harley Combination, 3 lamps, electric horn, speedometer, spring pillion seat, mileage 4,600 only, like new; sacrifice 55 gns.—L.-Cpl. Cobbold, Dispatch Rider, Horse Guards, Whitehall. [2596

HARLEY-DAVIDSON Combination, 1915, electrically equipped, aluminium disc wheels all round, hood and screen, etc.; £75; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0498

1916 Harley-Davidson Model 16J, Robertson chassis, Model O body, electrically equipped, spares, inner tube, and 4 gallons Harley oil; seen by appointment; 90 gns.—Dolby, 1, Junction Rd., opposite Highgate Tube. [2528

1917 Model Harley-Davidson, P. and H. lamp, Smith speedometer, only run 550 miles, splendid condition, £125; Swan sporting sidecar; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0499

HARLEY-DAVIDSON, 1915 electric model, Gloria sidecar, Triple wind screen, Cowey speedometer, all purchased new July, 1916; cost £105; done 2,500 miles only, guaranteed as new; £75.—Electric Supply Co., Wellingborough. [X0273

1916 (late) Harley-Davidson Combination, Millford coachbuilt, extra strong, underslung, only done 2,000 miles, like new, with lamps, tools, everything complete; seen and ridden any time; 85 gns., a bargain.—Miller, 62, Hampstead Rd., N.W.1. [2587

HARLEY-DAVIDSON 1917 Electric Combination, H.D. sidecar, ridden approximately 300 miles, quite as new, £135; also three 1915 models, from £65; and one 1916 model, £84.—Lamb,'s, 151, High St., Walthamstow, and 50, High Rd., Wood Green, N. [2284

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1917 dynamo-lighting Harley-Davidson, double-seater sidecar, 119 gns.; 1916 standard Harley-Davidson, double-seater sidecar, as new, 79 gns.; 1915 T.T. Harley, 7-9h.p., 3-speed, disc wheels, khaki finish, just overhauled by makers, 59 gns. (D) [2653

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0487

Henderson.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1915 Henderson combination, 10 h.p., 2-speed, coach sidecar, disc wheels; 75 gns. (D) [2654

Hobart.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Hobart, 1916, 2-speed, 2-stroke, as new; 26 gns. (D) [2664

Humber.

HUMBER, 3½h.p., single speeded, £11/10; 3½h.p., 2 speeds, £19/10.—Motor Exchange, Horton St., Halifax. [2560

3½h.p. Humber, Sturmey-Archer 3-speed, Bosch, B.B., climb anything; £20.—Pearce, Woodmancote, Cirencester. [2554

1913 3¾h.p. Humber Twin, 3-speed gear, excellent tyres, good condition; £14/10.—Robinson's Garage, Green St., Cambridge. [2604

HUMBER, 1915, 3½-4h.p., mag., 3 speeds, clutch, kick, like new; 35 gns.; easy terms quarter down, monthly payments.—Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). [2613

Indian.

INDIAN, 7-9h.p., 1914, dismantling, 2-speed; all parts cheap; send offers.—Fox, 28, Hugh St., Victoria [2541

INDIAN, 7-9h.p., 1914, very little used, owner with H.M.S.; 37 gns.—Dumelow, Branstone, Burton-on-Trent. [X0465

INDIAN, 1912, 4h.p., 2 speeds, £22/10; 1912, 7-9h.p., single speed, £27/10.—Motor Exchange, Horton St., Halifax. [2561

1915 7-9h.p. Indian, needs slight adjustments, unused for 2 years; £27/10, no offers.—436, Whitehorse Rd., Thornton Heath. [2678

INDIAN 1916 7-9h.p. Combination, everything complete, like new; £85, or near offer; can be seen in London.—Sherrard, Tatsfield, Surrey. [2519

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1916 T.T. Indian, 7-9h.p., clutch, perfect, 39 gns.; 1915 ditto, disc wheels, 39 gns.; another, 37 gns.; 1914 ditto, 33 gns.; 1915 7-9h.p. spring frame Indian and coach sidecar, 59 gns.; 1914 ditto, 49 gns.; 1912 Indian, 5-6h.p., cane sidecar, 2-speed, 29 gns.; 1914 spring frame 7-9h.p. Indian, 2-speed, 36 gns.; 1915 5h.p. Indian, 3-speed, 38 gns.; nearly new Indian coach sidecar, perfect, 11 gns.; also Indian, 2-speed gear, frame, mag., and engine.—'Phone: Hampstead 5392 or 4904. (D) [2641

UNRIVALLED CHOICE

1918 **A.J.S.**, 6 h.p., 3-speed	**£91 6**
1918 **NORTON** 'Big 4,' all chain	**75 Gns**
1917 **ZENITH-GRADUA**, twin..	**70 Gns**
1917 **ZENITH-GRADUA**, kick-starter..................	**75 Gns**
1917 **ROVER**, T.T., Philipson ..	**£67 10**
1917 **ROVER**, 3-speed, clutch ..	**£80 0**
1917 **ROVER**, 5-6 h.p., W.O. model, J.A.P. 3-speed........	**£97 10**
1917 **ROVER**, 5-6 h.p., W.O. model, 3-speed, and Sidecar	**£124 5**
1917 **ROVER**, T.T., Philipson ..	**55 Gns**
1917 **NEW IMPERIAL-J.A.P.** ..	**40 Gns**
1917 **NEW IMPERIAL-J.A.P.**, kick-starter.............	**47 Gns**
1917 **NEW IMPERIAL-J.A.P.** ..	**32 Gns**
1917 **LEVIS** Popular, 2-stroke ..	**£32 0**
1917 **LEVIS**, 2½ h.p., 2-speed ..	**£47 10**
1917 **LEVIS**, 2½ h.p., single-speed	**35 Gns**
1916 **ENFIELD**, 3 h.p., 2-speed..	**39 Gns**
1915 **A.J.S.**, 6 h.p., and Sidecar with wind screen	**75 Gns**

JULIANS, 84, Broad St., READING

Biggest Light Car and Motor Cycle Dealers in the South.

46 years' reputation. 'Phone: 1024

MOTOR CYCLES FOR SALE.

J.A.P.

4h.p. J.A.P., 1912, 3-speed, good order, new tyres; 20 gns.—Dumelow, Branstone. [X0466

J.H.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1917 J.H., 8h.p. M.A.G., Sturmey countershaft gears, coach sidecar, hood, screen; 79 gns (D) [2657

James.

JAMES, all models, new and second-hand; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0500

RIDER TROWARD and Co., 31 and 78, High St Hampstead.—1914 James Canoelet combination, 3-speed, perfect; 42 gns. (D) [2655

JAMES 1916 Combination, Lucas dynamo lighting, Stewart speedometer, price £78; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0504

JAMES 4¼h.p. 1916 Combination, advertised to-day £99, Lucas lamps, tools, and apron included, has been carefully used, first-class turnout; £60.—Great Stone, Northfield, Birmingham. [X0446

Kerry.

3½h.p. Kerry Motor Cycle, fitted with gear, £5/10; Indian sidecar, £3.—50, Balls Pond Rd., Islington. [2583

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1912 Kerry-Abingdon, 3½h.p., 2-speed, coach sidecar; 24 gns. (D) [2678

Levis

1916 2¼h.p. Levis, splendid condition; 25 gns.—Garratt, Victoria Rd., Market Drayton. [X0424

Lincoln-Elk.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1913 Lincoln-Elk, 3½h.p., variable gear, perfect; 19 gns. (D) [2681

Martin.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1914 T.T. Martin-Jap, 3½h.p., o.h.v.; 24 gns. (D) [2674

Matchless.

T.T. Matchless-Jap, 6-8h.p., o.h.v., Bosch, B. and B.; £22, bargain.—Phipps, 44, Hastings Rd., Maidstone. [2535

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1915 Matchless, 8h.p., 3-speed combination; 59 gns. (D) [2658

MOTOR CYCLES FOR SALE.

Matchless.

MATCHLESS 8h.p. Combination, new, fitted with J.A.P. or M.A.G. engines; extended payments or exchanges.—Service Co., 292, High Holborn, London, W.C.1. [X0502

Minerva.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Minerva, 3½h.p., mag.; 9 gns. (D) [2659

3½h.p. Minerva, mag., spring forks, Mabon clutch; £15.—Mackenzie, 63, Brigstock Rd., Thornton Heath. [2628

Motosacoche.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Motosacoche, 1915, 3½h.p. twin, Enfield gears; 45 gns. (D) [2660

Nestor.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1914 Nestor, 4h.p., 3-speed; 24 gns. (D) [2676

New Hudson.

NEW Hudson, 3½h.p., 3-speed, clutch, Bosch mag.; £33/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0449

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1915 New Hudson, 6h.p., countershaft drive, 3-speed, coach sidecar, 59 gns.; 1915 New Hudson, 4h.p., 3-speed countershaft drive, coach sidecar, 38 gns.; 1916 New Hudson, 2-stroke, 2-speed, 26 gns. (D) [2683

New Imperial.

IMPERIAL-J.A.P., new, 2¼h.p.; 38 gns.—Clifford's Garage, Sidcup. 'Phone: 4. [2631

CROW Bros., Guildford.—New Imperial, latest 2½h.p., 3½h.p., 6h.p. models in stock; also sound second-hands. [1047

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1916 New Imperial-Jap, 2-speed, 26 gns.; 1915 ditto, 22 gns. (D) [2661

IMPERIAL-J.A.P., 2-speed, clutch model, £32/10; also new models in stock; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0450

1917 New Imperial-Jap, absolutely equal to new; 32 gns.—Julians, 84, Broad St., Reading. 'Phone: 1024. Closed: Wednesdays 1 o'clock. [0932

1917 New Imperial-Jap, 2¾h.p., 2-speed, T.T., nearly new Stewart horn, P. and H. lamps, new spare belt, spare toolbag; £35, or I will put balance and exchange for £50, or £100 War Loan.—262a, High St., Lincoln. [2525

Norton.

NORTON, 1914, 3½h.p., free engine, 3-speed; £25.—M. E. Cook, 54, Hallgate, Doncaster. [X0428

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1915 T.T. Norton, Philipson; 37 gns. (D) [2662

NORTON.—Big 4 Military Model, all-chain; also chain-cum-belt; £57/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0489

3½h.p. T.T. Norton, 1914, Philipson pulley, lamps, generator, etc., speedometer, new belt, accessories, excellent condition throughout; £40.—8, Moorland Rd., Leeds. [2551

BIG Four Norton, latest Civilian Model, practically new; searching inspection by makers welcomed; climbs Wyche Cutting, Malvern, on second; tyres excellent, lamps, speedometer, watch, horn, Ding-Dong bell; tools, spares, petrol; £70.—Major Pease, Willesborough, Kent. (D) [X0384

N.S.U.

N.S.U. 2-speed and Sidecar; £4/10, bargain.—88, Asylum Rd., Peckham. [2543

N.S.U. T.T. Racer, 6h.p. twin, 2 speeds; 20 gns.; accept cycle part.—77, Acre Lane, S.W.2. [2572

N.S.U., 3½h.p., 2 speeds, and new 1917 coach sidecar; £24/10.—Motor Exchange, Horton St., Halifax. [2562

1914 N.S.U. 4½h.p. Twin, mag., 2 speeds, runs splendidly; £22/10; exchange lightweight.—1, Ebner St., Wandsworth. [2614

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—N.S.U., 1914, 3h.p. twin, T.T., very fast; 24 gns. (D) [2663

1914 N.S.U., absolutely as new, 2 speeds and free, in perfect order; £15, the bargain of the week.—Extractor Silencer Co., Cambridge. [X0484

2¾h.p. N.S.U., in good running order, nearly new tyres, low built frame; also 2½h.p. Ariel engine, with free-engine pulley, less cylinder; lot £7/10.—Sigrist, 7, Jerningham Rd., New Cross. [X0387

HAVING Acquired the Entire Stock-in-trade of the N.S.U. Motor Co., Ltd., we can now supply spares for practically all types of N.S.U. motor cycles. In ordering it is important to submit old parts as patterns.—Eagles and Co., Acton Hill Works, Acton, W.3. [X0455

O.K

O.K. Juniors.—Call and inspect at the N.W. district agent, F. J. Youngs, 2-3, The Parade, Kilburn. [0910

Precision.

PRECISION, 3¾h.p., 1914, Armstrong Mark VII. hub, C.B. sidecar, good condition; £37.—Thomas, 83, Devonport Rd., Shepherd's Bush, W. [2586

MOTOR CYCLES FOR SALE.

Premier.

REMIER, 1914, 3½h.p., 3-speed, clutch, and K.S., Stewart speedometer, lamp, and horn, £34/15; 1916 mbination, £61/15; E.P. or exchange.—The Service ., 292, High Holborn, W.C.1. [X0494

IDER TROWARD and Co., 31 and 78, High St., Hampstead.—1915 countershaft Premier, coach ecar, 45 gns.; 1916 ditto, 49 gns.; 1914 ditto, 37 s.; 1914 Premier, countershaft, solo, 29 gns.; 1911 emier, single speed, 16 gns. (D) [2682

Quadrant.

UADRANT, 3½h.p., 1911, B. and B. automatic carburetter, spring forks, fitted for substitute; £7.—ggatt, 40, Thurlow St., Wandsworth Rd., Clapham, W.8. (Close Wandsworth Rd. Station.) [2588

Radco.

RADCO, 1917, 2½h.p., 2-stroke, as new; £25; extended payments or exchange.—Service Co., 292, igh Holborn, London, W.C.1. [X0497

Rex.

h.p. Twin Rex, Bosch, Grado, order guaranteed; £14, offers wanted; exchange push cycles and cash.—rookes, 90, Burton Rd., Lincoln. [X0422

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1912 Rex, T.T., Philipson, 3½h.p., 5 gns.; 1913 Rex, 6h.p. twin, 2-speed, 1916 coach decar, 35 gns.; 1914 Rex, T.T., 8h.p., clutch, 28 ns. (D) [2668

Rover.

ROVER.—All new models supplied; E.P. or exchange—Service Co., 292, High Holborn, London. [X0448

ROVER T.T., equal to new; 55 gns.; 1917 model.—Julians, 84, Broad St., Reading. 'Phone: 1024 [0929

ROVER, 1913, Armstrong, B. and B., ready to ride away; £24.—S. W. Clayden, Steeple Bumpstead, ssex. [X0403

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1917 T.T. Rover, as new, Philipson ulley, 44 gns.; 1913 clutch Rover, 26 gns. (D) [2669

Royal Ruby.

ROYAL Ruby.—All new models supplied; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0490

Rudge.

RUDGE Multi, 5-6h.p., coachbuilt sidecar, very smart; £45.—Motor Exchange, Horton St., Halifax. [2563

1914 Rudge Multi and Rudge sidecar, apron, King of Road head lamp, rear lamp, horn, and accesories, perfect order; must be sold; £40.—Extractor ilencer Co., Cambridge. [X0482

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Rudges. 1917 Multi, 47 gns.; 1916 Multi, coach sidecar, 49 gns.; 1914 Multi, 5-6h.p., 36 ns.; 1914 Multi, sidecar, 35 gns.; 1913 Multi, T.T., 27 gns.; 1913, Philipson, 23 gns.; 1912, 2-speed, 21 ns.; 1912, clutch, 19 gns.; also many Rudge parts, nd complete engine and frame. (D) [2670

Scott.

SCOTT, 1913, Bosch mag.; £37/10; 2-speed, clutch, and kick starter; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0451

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Scott, 1915, Service finish, 42 gns.; ditto, standard finish, 37 gns.; ditto, 1913, 29 gns.; ditto, 1912, coach sidecar, 27 gns.; all Scott parts in stock, including engine, magneto, frame, and gears. (D) [2671

Sheffield Minor.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1916 Sheffield Minor, 2-stroke; 24 gns. (D) [2667

Singer.

SINGER, 2½h.p., 1914, fixed gear, good condition; £24.—Boult, Hairdresser, Chesterfield. [X0468a

SINGER, 2½h.p., 1915, 2-speed, clutch, speedometer, lamps, horn Palmers, 1918 B. and B., Pilot jet; cash £24, lowest; all sound order; first cheque secures.—H. W. Scales, West Butterwick, Doncaster. [X0467

Sparkbrook.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Sparkbrook, 1917, 2-stroke, 2-speed as new; 27 gns. (D) [2665

SPARKBROOK 2¼h.p., 2-stroke, 2 gears, only done 200 miles, and brand new in September, number plates attached, also horn, and all tools; bargain, £38—Vicary, Corn Merchant, South Molton. [2545

Sun.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Sun-Jap, 1916, 8h.p., Sturmey countershaft gears, coach sidecar; 69 gns. (D) [2572

Sunbeam.

3½h.p. Sunbeam, complete, lamps, horn, etc.; £46.—Cross, Jeweller, Rotherham. [X0472

1915 6h.p. Sunbeam and Gloria coachbuilt sidecar lamps, horn, speedometer, Bosch mag., first-class condition; £70.—Binns, 135, Walsgrave Rd., Coventry [X0272

FOR

RELIABLE MACHINES

COMBINATIONS.

1917 **SUNBEAM** Combination, 3½ h.p., W.D. model, electric lights and horn, discs, speedometer, mechanical horn; bargain	£89	0
1916 **SUNBEAM** Combination, 8 h.p., M.A.G., interchangeable wheels, lamps, horn, screen, luggage grid, splendid condition	£110	0
1916 **HARLEY-DAVIDSON** Combination, 7-9 h.p., electric model, in very good order	£85	0
1916 **B.S.A.**, 4¼ h.p., chain-cum-belt, and Millford Sidecar, lamps, horn	£65	0
1915 **INDIAN**, 5 h.p., and Swan torpedo Sidecar, lamps, horn, speedometer	£45	0
1914 **MATCHLESS** Combination, 8 h.p., M.A.G., lamps, horn	£65	0

SOLO MACHINES.

1914 **TRIUMPH**, 4 h.p., 3-speed, lamps, horn, speedometer	£40	0
1916 T.T. **NORTON**, 3½ h.p.	£45	0
1917 **ROVER**, T.T., 3½ h.p., Philipson pulley, lamps, horn, as new	£50	0
1915 Countershaft **TRIUMPH**, 4 h.p., lamps, horn, speedometer, very nice condition	£55	0
1917 **ZENITH-GRADUA**, 4-5 h.p., clutch, kick-start, as new	£75	0

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ELCE & Co

15-16, Bishopsgate Avenue, Camomile Street, E.C.3.

'Grams: "Elcemocyca, London"
'Phone: Avenue 5548.

MOTOR CYCLES FOR SALE.

Swift.

SWIFT and C.B. Sidecar, 1915-16, 3½h.p., clutch, and K.S., complete with lamp and horn, splendid condition; £49/10; E.P. or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0453

T.D.C.

DE LUXE T.D.C., 2-stroke, 1916, 2¾h.p., nearly new, spring forks, lamp, horn; £19/10.—Gregory, 157, Leander Rd., S.W.2. [2558

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1917 T.D.C., 2-stroke, as new, 21 gns.; 1914 T.D.C., 4h.p., 3-speed, 24 gns. (D) [2673

Torpedo.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1914 Torpedo-Precision, 4h.p., clutch, 17 gns.; 1913 ditto, 2-speed, 19 gns. (D) [2684

Triumph.

TRIUMPH 2-stroke, in excellent condition; £38.—Anderson, Marton, Rugby. [X0425

1911 Triumph, 3½h.p., tyres good, all accessories, in running order.—B. Green, High St., Holt. [X0274

TRIUMPH, 1912, clutch, perfect condition; £26, or part exchange 5-6h.p. countershaft Indian.—Davies, Wendros, Boncath, Pem. [X0400

TRIUMPH, late 1913, 3½h.p., 3-speed, semi-T.T. model, in very nice condition throughout; £25.—46, Hilcrest Rd., Acton. [2633

1914 Triumph, 4h.p., 3-speed, Millford sidecar, lamps, horn, etc., complete, just overhauled.—E. J. Stanbra, Wigginton, Banbury. [X0205

3½h.p. Triumph Coachbuilt Combination, free engine, 2 speeds, perfect order, good condition; £20, snip—Box 1,557, c/o *The Motor Cycle.* [X0460

TRIUMPH, 3½h.p., £17/10; 1912-3, Bosch mag., S.A. free-wheel clutch, £26/10; E.P. or exchange—The Service Co., 292, High Holborn, W.C.1. [X0495

TRIUMPH, fitted with gas bag, and box fitted to chassis, suitable for commercial purposes; bargain, £17; letters only.—12, Roslin Rd., S. Acton, W.3 [X0369

TRIUMPH, 3½h.p., 1912-13, Bosch mag., new tyre, belt, horn, new lamps and new piston, just overhauled, in good running order; £22.—J. Roberts, 13 Cold Moss Heath, Sandbach. [X0406

1915 Triumph, 5-6h.p., 3-speed, with accessories, perfect order, Canoelet sidecar for same extra; would exchange for a large model 2¾h.p. Douglas, Gloria 30 gn. sidecar; offers.—D. C. Price, Thorpe Surrey. [X0443

MOTOR CYCLES FOR SALE.

Triumph.

RIDER TROWARD and Co., 31 and 78, High St. Hampstead.—1917 Triumph, countershaft, unscratched, 72 gns.; 1914 Triumph, 3-speed, 37 gns.; 1913 Triumph, 2-speed, 26 gns.; 1913 T.T. Triumph 23 gns.; 1911 standard Triumph, 17 gns.; sidecars to fit. (D) [2675

Trump.

TRUMP-J.A.P., 3½-4h.p., footboards; £19; E.P or exchange.—The Service Co., 292, High Holborn, W.C.1. [X0496

Williamson.

WILLIAMSON Combination, speedometer, etc., in thorough order; £75.—Goldsmith, 98, Ebury Mews, Eccleston St., S.W. [2595

Zenith.

ZENITH, 1914, 5h.p., countershaft; £35; exchange less power considered.—Particulars, F. Taylor, Saltfleetby, Louth. [2549

1915 3½h.p. Twin Zenith, clutch, kick start, Gradua gear, complete, in excellent order; £29.—Robinson's Garage, Green St., Cambridge. [2606

ZENITH, 1912, 6h.p. J.A.P., combination, been carefully used, perfect order; £35, or exchange for new engine and wheels to make cycle car.—Lea, 54, Abbey St., Nuneaton. [X0463

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Zeniths, direct drive models in stock as follows: 1917 8h.p., 69 gns.; 1915 T.T., 90 bore, 48 gns.; 1913 6h.p., fine order, 35 gns.; 1914 4h.p., 29 gns.; 1913 4h.p., 25 gns.; 1912 4h.p., 22 gns.; several sidecars to fit; countershaft models, 1915 8h.p., Burberry 20 gn. sidecar, 59 gns.; 1914 6h.p., sporting sidecar, 45 gns.; 1915 6h.p., underslung Mills-Fulford sidecar, 49 gns.—'Phone: Hampstead 4904 and 5392. (D) [2642

Ladies' Motor Cycles.

LADY'S New Imperial-Jap, 1917 model, 2¾h.p., 2-speed, clutch, kick start, as new; £40.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0551

Miscellaneous.

JAMES, 1915, 2¼h.p., 2-stroke, 2 speeds, excellent condition; £32.—See below.

JAMES, 1916, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £36.—See below.

JAMES, 1917, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £40.—See below.

ROYAL Enfield, 1917, 3h.p., lamps, horn, and speedometer (as new); £50.—See below.

ROYAL Enfield Combination, 1915, 6h.p., lamps, horn, speedometer, etc.; £60.—See below.

ROYAL Enfield Combination, 1916, 6h.p., lamps, horn, and speedometer; £78.—See below.

ALLON, 1915, 2¾h.p., 2-stroke, excellent condition; £25.—See below.

ALLON, 1916, 2¾h.p., 2-stroke, excellent condition; £30.—See below.

ALLON, 1917, 2¾h.p., 2-stroke, 2 speeds; £40.—See below.

ALLON, 1917, 2¾h.p., 2-stroke, 2 speeds, clutch model, lamps, and horn; £43.—See below.

CALTHORPE, 1915, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £27.—See below.

RUDGE, 1916, 3½h.p., Multi gear and clutch, lamps and horn; £42.—See below.

B.S.A., 1914, 4¼h.p., Model K, 3 speeds, clutch, and kick starter; £40.—See below.

TRIUMPH Junior, 1915, 2¼h.p., 2-stroke, 2 speeds, lamps, horn, and speedometer; £36.—See below.

PREMIER, 1913, 3½h.p., countershaft gear and clutch, fitted with coachbuilt sidecar; £38.—See below.

SINGER Lightweight, 1912, 2h.p. model, in fine order; £15.—See below.

NEW Imperial-Jap, 1915, 2½h.p., 2-speed model; £27.—See below.

CLYNO Combination, 1914, 6h.p., hood, screen, detachable wheels and spare wheel complete, lamps, horn, and speedometer; £62.—See below.

V.T.S., 1916, 2½h.p., 2-stroke, 2 speeds; £20.—See below.

ALL the above motor cycles are ready for immediate delivery, and deferred payments can be arranged for any of them. Write for further particulars to The Eastern Garage Co., 418, Romford Rd., Forest Gate, E.7. Tel.: No. East Ham 490. T.A.: Egaraco, London. [2557

MOTOR Cycle and Sidecar, cycle wants repairing, sidecar good condition; no reasonable offer refused for quick sale.—O.H.V., 12, Sussex St., Poplar, E.14. [2540

BARGAINS; absolute clearance.—1915 Wolf, 2-stroke, £10; 1914 Douglas, 2-speed, kick start, clutch, £28; 1913-14 4h.p. 3-speed Triumph, clutch, kick start, half compression, £33; 1914 7-9h.p., spring frame Indian combination, underslung coachbuilt sidecar, 2 speeds, clutch, kick starter, £35; 1913 Scott combination, 2-speed, kick start, low sporting sidecar, £35; no offers; must clear.—Douglas S. Cox, the A.S.M.M., 6c Lansdowne Hill, West Norwood, S.E.27. [2490

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Miscellaneous.

BOOTHS Motories, Portland Place, Halifax.—Detailed list of motor cycle bargains free.

HARLEY-DAVIDSON, 7-9h.p., fitted with grey coachbuilt sidecar; £69/10.—Booths Motories.

TRIUMPH, 1910, free engine, T.T. bars, good tyres; £18/10.—Booths Motories, Halifax.

BRADBURY, 4h.p., 1911, Grado gear, coach sidecar. with screen; £25/15.—Booths Motories.

TRIUMPH, 191 free engine model, in nice condition; £21/15.—Booths Motories, Halifax.

REX, 6h.p. 1909, mag., spring forks, good tyres; £13/15.—Booths Motories, Halifax.

SINGER, 3½h.p., 1913, 3 speeds, £12/12 coach sidecar; £31/10.—Booths Motories, Halifax.

PREMIER, 3½h.p., 1911, 3-speed gear, Bosch mag.; £21/10.—Booths Motories, Halifax.

RUDGE Multi 3½h.p., 1914, T.T. model, enamelled red; £29/15.—Booths Motories, Halifax.

SPECIAL Bargain.—3½h.p. Triumph, 1910, free engine model; £16/10.—Booths Motories, Halifax.

ZENITH, 5h.p., 1913, Zenith gear, nice coach sidecar; £42/15.—Booths Motories, Halifax.

CALTHORPE-J.A.P., 2¾h.p., 1915, Enfield 2-speed, £25/15; 3h.p. Minerva, mag., £8/15.—Booths Motories, Halifax.

2½h.p. 1914 T.D.C., £14/15; 1916 T.D.C., £17/10; 2¾h.p. 1914 Sun-Villiers, £16/15.—Booths Motories.

B.S.A., 4¼h.p., 1914, with sidecar, £45/5; Scott, 1912, and sidecar, £29/15; Rudge, 1912, Grado gear, £19/15; Rudge, 1913, Multi gear, £25/15; 3½h.p. Excelsior, £4/19.—Booths Motories, Halifax.

1913 6h.p. Rudge Multi and Montgomery sidecar; £36/15; 7-9h.p. Harley-Davidson, 1914, 2-speed, £42/10.—Booths Motories, Halifax. [2507

4h.p. J.A.P. Engined A.S.L., enclosed Bosch, Amac, good condition, new tyres, £10; Alldays 2-stroke, perfect, £10.—Shaw, 89, Somerset Rd., South Farnborough, Hants. [X0510

MOTOR Cycle, with Kelecom engine, 4½h.p., 2-speed, and clutch, tyres and tubes new, thorough good engine, only wants retiming; inspection invited; price £10.—Siggers, 79, High St., Godalming, Surrey. [2533

RIDER TROWARD and Co., 31 and 78, High St., Hampstead, have for sale the following guaranteed machines under 30 gns. in price: Bat-Jap, 1910, 6h.p., 2-speed, 19 gns.; F.N., 1912, 2½h.p., 2-speed, 14 gns.; F.N., 1913, 5-6h.p., 2-speed, 23 gns.; Lincoln-Elk, 1913, 3½h.p., variable gear, 19 gns.; Rudge, 1912, 3½h.p., clutch, 17 gns.; ditto, 2-speed, clutch, 19 gns.; Rudge Multi, 1913, 24 gns.; Rudge Multi, 1913, T.T., 26 gns.; Rudge Multi, 1914, 29 gns.; Rudge Multi, 5-6 h.p., 1914, 29 gns.; Torpedo-Precision, 1914, 4h.p., clutch, 17 gns.; ditto, 2-speed, clutch, 23 gns.; Triumph, 1911 standard, 17 gns.; Allon, 1916, 2-speed, 2-stroke, 29 gns.; Bradbury, 1912, 4h.p., 2-speed, clutch, 19 gns.; B.S.A., 1913, 3½h.p., 2-speed, clutch, 27 gns.; Coventry Eagle, 1916, 2-speed, 2-stroke, 27 gns.; Crescent, 1917, 2-speed, 2-stroke, 28 gns.; Douglas, 1913, T.T., 2-speed, 28 gns.; Enfield 3h.p. twin, 2-speed, clutch, 29 gns.; Hobart, 1915, 2-speed, 2-stroke, 22 gns.; Indian, 1912, 6h.p., clutch, cane sidecar, 26 gns.; ditto, 2-speed, cane sidecar, 29 gns.; Ivy, 1915, 2-speed, 2-stroke, 23 gns.; Kerry-Abingdon, 1912, 3½h.p., 2-speed, clutch, cane sidecar, 25 gns.; Abingdon King Dick, 1914, 4h.p., 3-speed, 25 gns.; Martin-Jap, 1914, 3½h.p., overhead valves, 24 gns.; Metro, 1916, 2-stroke, 19 gns.; Minerva, 3½h.p., 12 gns.; Nestor, 1914, 4h.p., 3-speed, clutch, 24 gns.; New Hudson, 1916, 2-speed, 2-stroke, 26 gns.; New Imperial, 1915, 2-speed, 23 gns.; 1916 ditto, 26 gns.; Precision, 1913, 3½h.p., 2-speed, clutch, cane sidecar, 23 gns.; Precision, 1914, 4h.p., T.T., disc wheels, 24 gns.; Precision, 1914, 3½ h.p., clutch, 17 gns.; Premier, 1911, 3½h.p., disc wheels, 15 gns.; Premier, 1914, 3½h.p., 2-speed countershaft, 29 gns.; Brown, 3½h.p., 10 gns.; Rex, 1912, 3½h.p., Philipson, 17 gns.; Rex, 1914, T.T., 6-8h.p., clutch, 28 gns.; Scott, 1913, 3¾h.p., 2-speed, clutch, 29 gns.; Sheffield Minor, 1916, 2-stroke, 22 gns.; Sparkbrook, 1917, 2-speed, 2-stroke, 28 gns.; T.D.C., 1917, 2-stroke, 21 gns.; T.D.C., 1914, 4h.p., 3-speed, 24 gns.; Wolf-Jap, 1915, 4h.p., 3-speed, 29 gns.—Below.

RIDER TROWARD and Co. guarantee any of the above, and invite enquiries regarding these and others. Full list of 150 in stock sent free. All the above machines can be purchased at quarter down, balance in instalments to suit convenience of customer, provided that the machine remains with us till paid for. An excellent opportunity is therefore offered to obtain a good machine now at a moderate price before the end of the war and the consequent rise in prices. Machines so purchased are stored by us free, and are also insured and cleaned till required. Fullest details on application.—31 and 78, High St., Hampstead 'Phone: 5392. (D) [2463

SIDECAR ATTACHMENTS.

SIDECAR, wicker, canoe shape, 3in. Palmer tyre, strong; £3/5.—3, King William St., Greenwich. [2621

THE Willowbrook Co., Leicester, solicit your enquiries for sidecars of all descriptions. Write for illustrated catalogue. [0718

MILLFORD Corvette Sidecar, good order, £10/10; lightweight sidecar, suit 2¾h.p. motor, £9.—Cross, Agent, Rotherham. [X0473

'KING DICK'

WELL and truly made from forged steel, "King Dick" Spanners grip "fair and square." They cannot burr a nut when properly adjusted. Famous for 35 years: guaranteed for ever. Four sizes, 3in. to 9in

See that your spanner is stamped with the Bulldog mark here shown—the mark of the genuine "King Dick."

Orders dealt with as Government requirements permit.

ABINGDON-ECCO, LTD.
Abingdon Works, Tyseley,
Birmingham.

London: G. H. Smith, 12, Mortimer Street, W.1.

SIDECAR ATTACHMENTS.

CORONET Sidecars.—Illustrated catalogue free upon request.—Booths Motories, Portland Place, Halifax.

CORONET Sidecars from £9/15; special model for Harley-Davidson, enamelled French grey.

CORONET Sidecars from £9/15; special model for Indians, enamelled red, 28in. tyre.

CORONET Sidecars; special coachbuilt model for lightweights, £9/15; illustrated list free.

CORONET Sidecars are made to suit any machine, and delivered from stock.

CORONET Sidecars.—Send for illustrated catalogue from Booths Motories, Portland Place, Halifax

SIDECAR Wheels, lugs, mudguards, long lengths tubing; state requirements.—Booths Motories Halifax. [2506

1917 New Shop-soiled Sporting Sidecar, coachbuilt, cigar shape; cost 20 gns., offers.—1, Ebner St., Wandsworth (Town Station). [2615

BASTONE'S for Sidecars.—New coachbuilt, complete with Michelin tyre, £9/15; also other models at clearance prices.—228, Pentonville Rd., King's Cross, London, N.1. [2627

PHŒNIX Sidecars, new and second-hand; also several new stock soiled to clear; 100 complete sidecars always in stock; list free.—Phœnix Sidecars, 736, Holloway Rd., London. [2333

GLORIA A1 Coach Sidecar, not run 100 miles, 4-point, luggage grid, locker under seat, storm apron, new; owner in hospital; £14/14, cost £19/19.—Vickers, Newsagent, Brandon Cully. [X0388

RIDER TROWARD and Co., 31 and 78, High St., Hampstead, have a large stock of second-hand coachbuilt sidecars, including designs for Indians, Harleys, Scotts, and B.S.A.'s; state requirements. (D) [2680

SIDE-CARRIERS AND PARCEL-CARS.

1916 Reading-Standard Motor Carrier, twin-cyl. engine, unused, box body; catalogue price £105. cash price £70, or near offer.—Box L4,378, c/o *The Motor Cycle.* [0891

BODIES.

CLEARANCE Lines.—Large stock cane sidecar bodies offered, stock soiled only; low prices.—Willowbrook Co., Leicester. [0901

BASTONE'S for Bodies.—New light coachbuilt, £3/10; also other models, underslung, step, and 2-seaters, at clearance prices.—228, Pentonville Rd., King's Cross, London, N.1. [2626

BODIES.

PHŒNIX Coach, wicker, cane bodies, single and tandem models in all colours; largest selection in the trade; several stock soiled to clear; repairs, repainting, and re-upholstering a speciality, actual manufacturers.—Phœnix Sidecars, 736, Holloway Rd., London. [2334

SIDECAR Body Designs for the trade only. Working, coloured, pencil, or line drawings of original designs, also working drawings full sized or to scale.—Cooper's Vehicle Journal, Ltd., established designers to the coach trade for over 80 years. Consult us when designing new ideas.—19, Garrick St., London, W.C.2. [0818

HOODS, WIND SCREENS, ETC.

PHŒNIX Manufacture Hoods from 35/-, screens 19/6. Immediate deliveries; special list.—Phœnix, 736, Holloway Rd., N. [2335

WIND Screens, 7 patterns, for sidecars, 19/6, 27/6, 30/-, 32/6, and 45/-; sidecar hoods, 37/6, 40/-, and 52/6.—Juno Showrooms, 248, Bishopsgate, London. [9492

CARS FOR SALE.

BABY Peugeot, late 1915 model de luxe, electric light, fully equipped; £140; first-class combination in part.—Box L5,350, c/o *The Motor Cycle.* [2635

SMALL 2-seater Car, 3 speeds and reverse, live axle, tyres and tubes nearly new and unpunctured, aluminium body; write for appointment; price £50.—Emery, 24, Beverley Rd., Chiswick. [2542

RIDER TROWARD and Co. have in stock G.N., G.W.K., Bayard, Lagonda, Calthorpe, Morris-Oxford, Morgan, and other light cars. Lists free.—31 and 78, High St., Hampstead. 'Phone: 5392. (D) [2464

WE have the following cars for sale for cash, extended payments, or your motor cycle in exchange: Enfield, Alldays, La Licorne, R.M.C., Morris-Oxford, Baby Peugeot, Bayard, Calthorpe, Humberette, Morgan, and also a Ford, Swift, and Milnes-Daimler van. Full particulars on application.—Service Co., 292, High Holborn, London. [X0503

GOING, Going, Gone.—Still some of the good ones left, however. Further reductions.—8h.p. Rover, 4-seater, dual, good condition, £17/10; 12h.p. Argyll, 3-seater, mag., gate, dickey, £20; 18h.p. Stella landaulet, live axle, gate, dual, Zenith, running order, £25; Ford 2-seater, 4-cyl., scuttle dash, dickey, good condition, £25; 9h.p. De Dion 15-cwt. van, solids behind, Rubberine front, proper commercial vehicle, £25; 12-16h.p. Brouhot chassis, gate, mag., £30; 20-28h.p. Darracq 25-cwt. van, mag., £35; 18h.p. Wolseley 1-ton van, chain drive, gate, Bosch, Smith's carburetter, £45; 12h.p. Buckingham cycle car, streamline 3-seater, aluminium body, sporty, £50; 14-16h.p. Ballot, 4-seater, torpedo, Bosch, Solex, smart, pulls well, £50; Beeston Humber lorry, gate, Zenith, £50; Straker-Squire lorry, enclosed valves, £50; Iris lorry, gate, Zenith, £50; 15h.p. Spyker van, runs well, £50; 15h.p. Talbot lorry, gate, 4 speeds, mag., £50; 25-cwt. F.I.A.T. van, solids behind, Bosch, Claudel, £50; 15h.p. Germain, 3-seater, dickey, gate, Zenith, £75; 18-22h.p. 6-cyl. Belsize chassis, detachable wheels, splendid condition, £75; 25 cwt. Mitchell van, solids behind, gate, dual, £75; 30 cwt. Albion-Lacre lorry, detachable tilt top, twin solids, gate, £75; 10h.p. Adamson sporting cycle car, 4-cyl. monobloc, enclosed valves, gate, underslung, mechanical starter, £75; 15.9h.p. R.C.H., 4-seater torpedo, Bosch, Zenith, centre gate, overhauled, repainted, £90; 15-20h.p. Paige, torpedo, splendid condition, monobloc, enclosed valves, Bosch, gate, detachables, Oxford blue, £90; 10h.p. Le Gui, 3-seater, double dickey, monobloc, enclosed valves, 4-speed, detachables, £90; 15.9h.p. Arrol-Johnston, torpedo, enclosed valves, 4 speeds, splendid condition, £100; late model Lacre van, commercial chassis, H.T. mag., gate, twin solids, carry 25-cwt., £100; 10h.p. Argo, sporting 2-seater, streamline, dickey, disc wheels, enclosed valves, smart, £100; 11.9h.p. 1914 Belsize chassis, monobloc, 4 speeds, Sankey, £100; special Ford, English torpedo, pointed radiator, electric self-starter, lots gadgets, £100; 26h.p. Russell-Knight chassis, sleeve valve engine, centre gate, £100; 2-ton Berliet chassis, twin solids, £100; 10h.p. Horstmann light car, 4-cyl. monobloc, enclosed valves, streamline, detachable disc wheels, £125; 15h.p. Crossley chassis, monobloc, enclosed valves, detachable wheels, £125; 13.9h.p. Vulcan, 4-seater, enclosed valves, worm, Zenith, £125; 10h.p. Turner light car, 3-seater, monobloc, enclosed valves, detachable wheels, worm, Zenith, £135; 12h.p. Siddeley-Deasy torpedo, 4-seater, enclosed valves, detachable wheels, worm drive, watertight Bosch, Zenith, £150; 11.9h.p. Belsize, 3-seater, dickey, dynamo lighting, enclosed valves, detachable wire wheels, £150; magnificent 25h.p. 6-cyl. Napier, interior drive saloon, enclosed valves, 6 gn. tax, revolving seats, frameless windows, wide roomy body, bargain, £250; 1917 Beaver commercial chassis, practically new, carry 25 cwt., aluminium radiator, Rubberine tyres, enclosed valves, monobloc, £295; now then, what about it? Cash only; no exchanges, no offers. Please call.—Douglas S. Cox, the absolutely straight motor man, 6c, Lansdowne Hill, West Norwood, S.E.27. [2627

RUNABOUTS AND CYCLE CARS.

MORGAN, 1914, air-cooled, good condition throughout; £65.—Boult, Hairdresser, Chesterfield. [X0468

1915 Morgan, complete with all accessories, in perfect order and condition; £85.—Missin, Cottingham, Hull. [X0401

MORGAN Grand Prix Model, fitted air-cooled J.A.P. or M.A.G. engine, overhauled and complete; £125.—Colmore Depot, 49, John Bright St., Birmingham. [2057

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The Capture of the German Dye Secrets.

THE recently announced achievement of the English dye trade experts in capturing from Switzerland the carefully guarded German dye trade recipes is an event of more importance to motorists than most of them will probably have realised. The use of aniline dyes is directly due to an English discovery that has been thoroughly exploited only by our greatest trade rivals—as has been the case only too often. It is now many years ago that an Englishman discovered the beautiful colouring matter to be obtained from certain of the anilines—by-products in the fractional distillation of coal tar—and his discovery was quickly taken advantage of by a German syndicate who soon established the enormous dye trade in which Germany easily led the world.

The development of this trade was directly due to the encouragement it received at the hands of the German Government authorities, who were quick to perceive the double advantage likely to accrue from the successful development of the new industry. Besides the natural advantage following to any nation from the acquisition of a great industry, this new trade had an entirely additional recommendation—it provided a field for the employment of those members of the benzene series that were obtained in the manufacture of coal tar, and that had hitherto been something after the nature of a waste product on the markets.

But the German Government saw further ahead than this, and many were the expressions of surprise in other countries when it was remarked that the Kaiser was showing an enormous interest in the industry. Not till the war broke out was the full secret revealed—*the benzene products were the main source of our most useful modern explosives!* Consequently by developing and encouraging the dye trade the German Government had also developed the most valuable possible resources for the war for which they had been so long waiting.

But besides the uses of the benzene series as a source of explosives—of T.N.T. to be precise—it is, of course, a most valuable fuel, and one that many motorists prefer to petrol. It will be remembered that long before there was any talk or suggestion of a petrol shortage all benzole had disappeared from the market because it was wanted for the making of explosives; it may also be remembered that one of the excuses put forward for the shortage of ammunition at the beginning of the war was the shortage of explosive material—in other words, of the raw material (benzole) for the manufacture of those explosives.

Now had this English invention of the aniline dye trade been kept in England by our Government as eagerly as it was introduced into Germany by the German Government, the relative positions of the two armies at the beginning of the war would have been reversed—we should have had an abundance of explosives and the Germans would have been short of them.

Now all this points to the enormous importance that should be attached to the magnificent achievement that has brought to these shores the incentive to our benzole producers to produce in large quantities. Their output will be developed primarily with the idea of meeting the requirements of the newly-established dye trade, but in the case of a national crisis it may be assumed that our then governing body will have the acumen to follow German precedent and to divert the greater part of the dyers' raw material into the fuel tank and the shell.

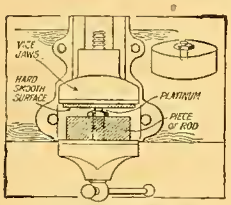
It may perhaps be as well to point out in conclusion, for the benefit of those of our readers not familiar with the nature of the benzenes and benzole, that the requirements of the shell factory and the motor tank do not exactly overlap, and that consequently there will be no ground for the assertion that the tank is being filled at the expense of the shell.

An Index to the advertisements in this issue will be found on the page facing the back cover

IDEAS: Useful and Ingenious.

SQUARING PLATINUM POINTS.

WHEN the platinum contacts of the make-and-break become pitted or do not meet squarely, a better way to deal with them than filing or hammering is this. From the "odds and ends" box, which most amateur mechanics have, get a thick bit of rod—the bigger the diameter the better, but not less than $\frac{1}{2}$in.—then make a central hole at one end into which the platinum screw will comfortably fit, resting with its head against the face of the rod, both faces of which must be square. Put screw and rod between the jaws of a vice, the platinum butting against a flat and smooth piece of hard metal, as shown in the figure. Squeeze the platinum against this metal surface in the vice, and the point will be flattened out as good as new.—H.A.C., Eastbourne.



Squaring platinum points without the use of a file or hammering.

TESTING SPARKING PLUGS

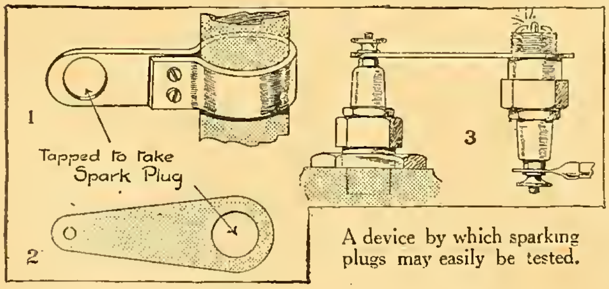
I AM submitting sketches of two plug testers that may perhaps be of interest. They are quite simple and inexpensive to make, and I have used them very successfully on cars and motor cycles for some years, finding them especially useful when reissuing used plugs for further service.

Fig. 1. To test plug for sparking, remove plug from cylinder, and with high-tension wire attached screw into hole provided in tester. The engine can now be revolved without any risk of plug falling—the usual result when it is balanced on some part of the machine by the old and exasperating method.

Fig. 2. This is a fitting for testing and showing the strength of spark at the points of a plug at any engine speed with the engine running with a good plug in the cylinder. The engine can be stopped and points adjusted any number of times until plug is giving its hottest spark. A number of plugs can be tested in a very short time with this device.

To use as shown in fig. 3, make sure that plug to be left in cylinder is working correctly. Remove terminal nut and high-tension wire from the plug, slip on tester, replace terminal nut and tighten. Screw plug to be tested into hole provided at other end of tester; attach high-tension wire and terminal nut.

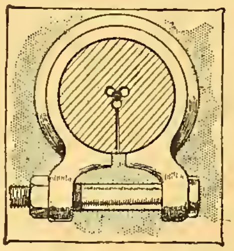
If this plug is O.K. the engine will run, and spark can then be observed and engine stopped for adjustment of points if necessary. If engine will not start, the points of plug to be tested can often be adjusted to spark correctly. I have not found this method of testing to have any injurious effect on the magneto, and it is a very fascinating operation to watch the spark dancing round a three-point plug.—D.R.C., Cardiff.



A device by which sparking plugs may easily be tested.

IMPROVISED SCREWING MACHINE.

FOR those who do not possess a screwing machine, spokes can be tightly fixed in a 1in. head clip, a screwed rod being utilised in place of the bolt. — Y.Q., Rouen.



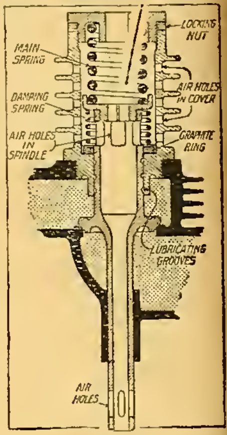
Head clip showing die in position.

DESIGN FOR EXHAUST VALVE.

SOME time ago an article suggesting the need for improvement in the design and construction of exhaust valves was published which gave a number of suggested improvements. Your criticism of some of the defects of these designs leads me to submit the following idea:

The design consists of a tubular spindle which carries the usual mushroom exhaust valve. Slots are cut in the spindle at the top and bottom ends to allow a free circulation of air for cooling purposes. The usual valve cap is replaced with a metal casing, made preferably of aluminium or gunmetal having radiating cooling fins, and being perforated with a number of holes for the passage of air through the valve spindle and round the springs.

In order to secure quiet running, two springs are suggested, the strong spring on the top being necessary to close the valve, and a light spring being placed underneath, to damp the sudden closing of the valve due to the strong spring, and to prevent undue noise and damage to valve seat. A locking nut has been provided to enable the load on the springs to be adjusted, thus permitting allowance to be made for the difference in the material, etc., in the springs themselves.



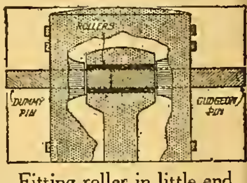
A suggestion for cooling the exhaust valve.

In order to secure lubrication of valve guide, and to prevent loss of compression, a graphite ring is placed at the top of the valve guide and held in place by the light spring. Lubrication grooves are turned on the body of valve guide, and as the graphite wears these grooves would become filled with graphite and tend to reduce wear and loss of compression to a minimum.

Of course I do not claim this to be an ideal design, but I think it has great possibilities for securing a really cool running and silent exhaust.—GEORGE E. BARR, Southsea.

ROLLERS IN LITTLE END.

TO insert rollers in little end of connecting rod, obtain a piece of steel shaft which is a loose fit in the gudgeon pin boles of the piston and about $\frac{1}{32}$in. or so shorter than the distance between inside face of bosses in the piston. Place the rollers and dummy pin in position in the connecting rod, and put piston in position also; then, when the gudgeon pin is tapped into place it will push the dummy pin out and, of course, maintain rollers in required position.—A.H.C., Coventry.



Fitting roller in little end of connecting rod.

OCCASIONAL COMMENTS.

By "IXION."

How Many Gears?

I SEE a friend is tilting at me for implying that four gears are not desirable on every motor cycle, so I must expound my position more perfectly. Motor cycle design is a matter of compromise. The nicest transmission I ever sat over—granted suitable road and weather conditions—was a countershaft Zenith with its ratios infinitely variable from about 4 down to 11 or so. Why does not every designer fit this drive? Not because it is patented—oh dear no. There are ways of dodging round almost any patent, and annexing the kernel of the device for yourself, whilst leaving the disgruntled inventor a disguised exterior at which to stare; our columns often contain ingenious illustrations of the plan. The Zenith transmission is not copied because it embodies a belt, and eke a belt with the minimum pulley diameter at the moment when maximum pulley diameter is desirable, to wit, when the load is greatest. So in the special interests of hill-climbers, sidecarists, and that type of amiable lunatic commonly known as an "all-weather rider," or "a hardy lad," other makers adopt the chain drive in lieu of camouflaging the Zenith patent by fitting the gear lever with a brass stirrup handle instead of the Zenith nickel knob. As soon as you adopt the chain, infinitely variable gears recede to the distant horizon with what Beatty calls "poor visibility" thrown in: and instead of umpteen gears we get a beggarly two, three, or four.

Two, Three, or Four?

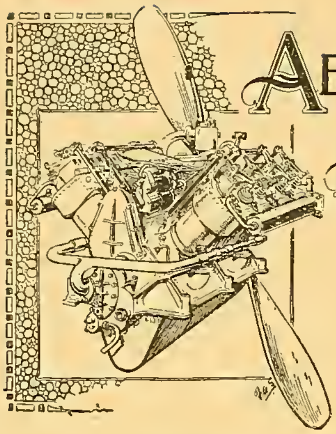
NOW my preference for two, three, or four gears reminds me of a hoary chestnut, viz., the Parliamentary candidate who rashly pledged himself to give a straight answer to a straight question, and was promptly asked whether he was a bigger fool than he looked or looked a bigger fool than he was. I cannot answer the alternatives by inditing a digit. It depends partly on the quality of the gear box. I would rather have a single gear than regain certain gear boxes which survive profanely in my memory; indeed, I would rather not own a motor cycle at all than accept one or two gears I wot of as a free gift. If anybody offered me a perfect six-speed gear box weighing 5 lb. I would give it instant preference over any gear now on the market. In actual fact, the more gears one specifies, the heavier and the more expensive the machine becomes. If you are rich, price doesn't matter. If you fit a sidecar, weight does not matter, as the machine supports its own weight. If you ride solo and have to wheel the jigger with one hand, whilst the other is more profitably employed on the far side of the waist of your latest fairy, unnecessary weight is an intolerable incubus, and so on. Adjusting these facts which determine the compromises, I arrive—and so, I suppose, do most people—at some such position as this. For a sidecar four gears are desirable. For a heavyweight touring mount de luxe, purchasable by strenuous people, a four-speed box, consisting of two close-set top ratios, a normal hill-climbing gear, and a reserve tree-climbing gear, is very nice indeed. For medium and light solo work, three gears are ample. For really light fast road work, two gears will do all that the hotstuff mount asks, and no hot-stuffer has ever yet appeared with the perfect hot-stuff two-speed gear.

The Motor Bicycle a la Ford.

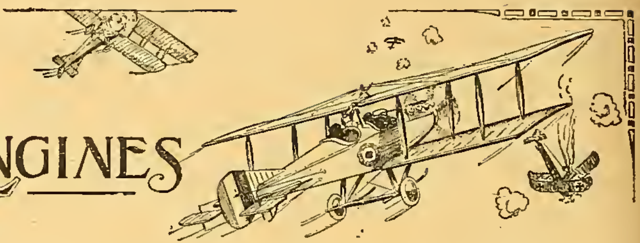
MY critic is perfectly correct in stating that I do most of my riding on a four-speed box, and that from time to time I give it free advts. of a somewhat fulsome character in this column. The machine in question is frankly designed as a heavy tourist mount de luxe, and it would be absurd to criticise it from the standpoint of Miss Shirley Kellogg doing a Park stunt on an auto-scooter, with brand new *chaussures* in evidence and a cinema man handy. When I wrote enthusiastically of two-speed gears, I had been musing on the following very sound lines. Prior to the war, motor cycles were chiefly built for buyers who had money to burn. The average motor cyclist is a person who has recently lost a relation with more money than brains. He has had a small legacy, which would have been far better devoted to a dogs' home or to a fund for providing Crimean veterans with decent baccy instead of shag. As money does not particularly matter to most buyers of motor cycles, motor cycles are designed and built accordingly; and their average pre-war price was at least £70. I even know many maniacs who have paid over £130 for a sidecar outfit. Now these are truly absurd prices to pay for a single-seated locomotive. I hope I may never even be carried to a casualty clearing station in a state of unconsciousness on a Ford car; but let us remember that in America an artisan can purchase a five-seated car in return for eight weeks' wages. In a world where you can buy 20 h.p. five-seated cars for £80 the continued existence of motor cycles averaging £70 apiece, as the standard of the world's markets, and not as the rank extravagances of gilded fools, is a yowling absurdity.

The Poor Man's Motor Cycle.

SO I had a kindly dream of some unborn genius who would do for motor cycles what Henry Ford has already done for motor cars, and sell usable solo machines at about £20 a time. It can be done, of course, and some day it will be done. If we don't do it, the Yanks will. If they go west before they get as far as that, the Japs will do it: and if the notion does not occur to the Japs when the yellow peril is top dog, Russia will do it when she is industrialised. Then the horny-handed son of toil will be able to invest, and to taste the joys of the road. He will have something better to do with his evenings than to trudge two miles to earth up his celery, or prop up a street corner, or sit on a hard, vertically-backed bench in the village pub until some sympathetic soul reads the visible thirst in his eyes, and passes over the pint pot. But this Ford motor cycle to come will not jump off with a four-speed gear. It will start its career very modestly with a two-speed. Which is why I wrote what I did. Partagas are all very well: but, if you cannot get one, a Gold Flake will do.



ABOUT AERO ENGINES

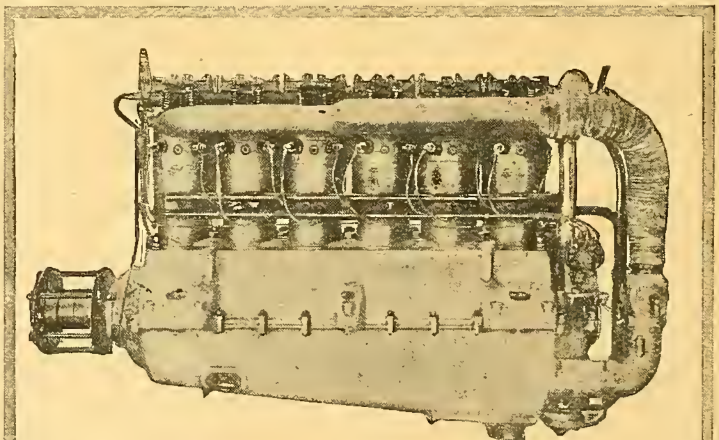


No. IV.—THE 260 h.p. GERMAN MERCÉDÈS AERO ENGINE.

Many of our readers are probably ignorant of the special features that distinguish aero engines from motor cycle and motor car engines. Samples of the leading types of aero engine are briefly described in this series of articles, the fourth instalment of which we print below.

THE latest type of German aero engine, described and illustrated herewith, possesses a very special interest, quite apart from the fact that two of these engines furnish the power unit of the raiding Gotha aeroplanes, or that we obtained these particulars from a Gotha which was shot down in battle. It represents the results of German study of aero engine design, and the German aero engine policy—a policy which is probably based on one of two blunders.

If German engineers concentrated on the six-cylinder vertical engine for aeroplanes because they fancied the war would last only a few months, and that the six-cylinder vertical was the type which they best understood and could most easily produce, they were technically right, and strategically wrong. If they fancied—as seems likely—that the six-cylinder vertical engine was intrinsically and permanently the best model for aero work, they were technically wrong. The engine under notice weighs 1,090 lb. approximately, without oil, fuel, or tanks, and develops 260 h.p. at its best flying speed. A rotary or radial engine can be built to develop equal h.p. power at half the weight; and the 5 cwt. saved by adopting a rival type of engine can be utilised for carrying additional weight, *e.g.*, in bombs, or for raising the climbing speed. Nor is weight the only handicap of the vertical six. It is abominably inaccessible, especially in an aeroplane, where it is lumbered up with gun gears, cowling, and other obstructions; you must take it out of the fuselage to perform any real work on it; and you will be lucky if you can remount it within twenty-four hours. By contrast, you can get the pistons out of a rotary or a radial in twenty minutes or so, without taking the engine out of the fuselage at all. Or, again, the six-cylinder vertical, with its tanks, occupies a very long stretch of the fuselage, as compared with the space required to house a shallow radial or rotary, and so makes for a machine which is slow on its controls, and cannot be developed into a first-class fighter. Or, again, if you prefer the V or Broad Arrow type of engine to the vertical, you can squeeze 520 h.p. or 780 h.p. into the space required by a six-cylinder 260 h.p.; or, alternatively, you can compress your 260 h.p. into a much shorter space by utilising a V eight-cylinder or a " triple four-cylinder." There is not a word to be said against the use of vertical sixes for certain types of plane, where sluggishness on the controls and lengthy engines do not matter, and where it pays to make sacrifices for the sake of a very substantial and durable engine.



The 260 h.p. Mercédès aeroplane engine. The bore of the cylinders is 160 mm. and the stroke 180 mm. Two inlet and two exhaust valves are arranged in the head of each cylinder, and are operated by an overhead camshaft running in a separate housing.

The Future?

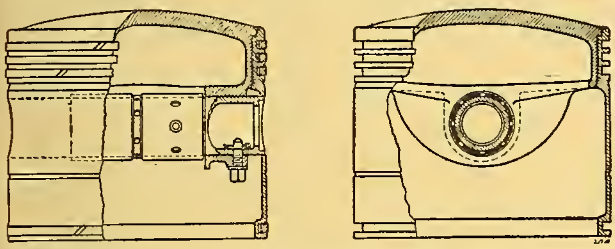
But through pinning their faith to one type of engine through 3½ years of war, the Germans now find themselves at the parting of the ways. For example, their best 1917 fighting scout, the Albatross, has this 260 h.p. Mercédès engine. It was notably outclassed by some of our 1917 scouts, and must be improved for this year. What sort of engine will their 1918 scout have? The Germans can hardly build bigger vertical sixes. Have they sufficient experience of the rotary, the radial, or the V to scrap their present policy and break out in a new type? Must they be content to build a lighter model of the 260 h.p. Mercédès? Their solution will be known very shortly. In the meantime they have made an obvious technical blunder.

About Aero Engines.—

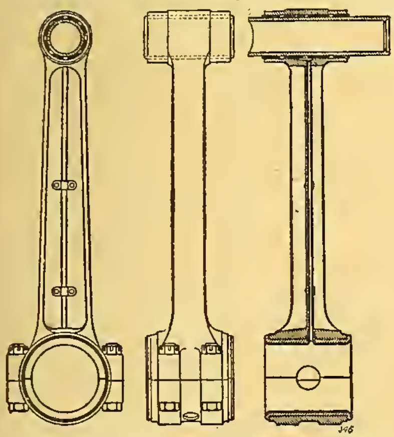
They have mistaken for the *Ultima Thule* of aero engine design a type which is merely a motor car engine, figuring as a temporary makeshift during the transition from the road to the air.

Mechanical Details.

When all this is said, we must admit that, as a vertical six, the big Mercédès is a very excellent job. It is built to last. The cylinder barrels are machined from steel forgings, and are screwed into machined steel heads.

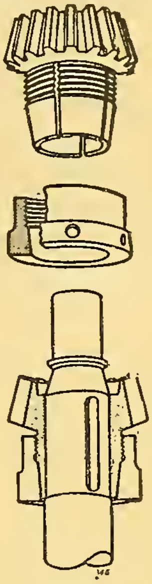

Arrangement of piston, gudgeon pin and bush.

The water jackets are made of steel pressings in four sections, acetylene welded on to the cylinder barrels and heads. Domed steel piston heads are used, into which cast iron skirts are screwed and welded. (These pistons are about 4 lb. apiece heavier than they need be.) Each cylinder has four overhead valves, two inlets and two exhausts, of about 2½in. diameter apiece. The overhead camshaft is driven by bevel gearing off a vertical shaft at the rear of the engine. The crankshaft weighs 139½ lb., and is 64 mm. in diameter. One of the remarkable details of the engine is the floating gudgeon pin bush. In place of the usual fixed phosphor bronze bush, a loose steel sleeve "floats" between the gudgeon pin and the little end of the connecting rod; it is a perfect working fit in both of them, and is freely perforated with ¼in. holes, through which oil enters.


The distinctive feature of the connecting rod is the floating gudgeon pin bush. It is a running fit in the small end and also on the gudgeon pin.

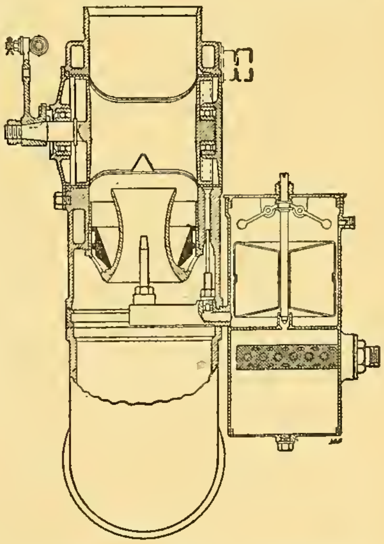
The Oiling System.

The lubricating system is rather complicated. After passing round the oiling circuit, the oil drains down into two sumps, located respectively below the front and rear of the crank case. A scavenging pump transfers the oil from the front sump to the rear sump; two sumps are needed because of the steep angles at which the engine is tilted in flight. The supply pump derives its oil from two sources; some of it is drainage oil from the rear sump, and some of it is fresh oil drawn from the tank by auxiliary pumps. When the oil in the rear sump exceeds a certain level, another pump returns the surplus to the tank. Thus a mixed stream of used and fresh oil is perpetually circulating. The oil channels through the engine are quite normal; as is usual on vertical aero engines, oil is pumped along the hollow crankshaft to the main and big end bearings, and up steel pipes (clipped to the connecting rods) to the gudgeon pin bushes. The pistons and cylinder walls are lubricated by splash with the oil which escapes at the edges of the crankshaft and connecting rod bearings. A separate pipe conducts lubricant to the inside of the hollow camshaft.

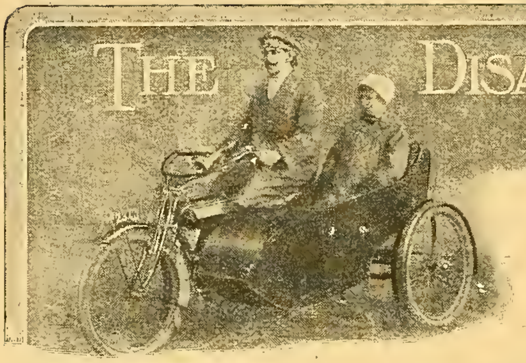

Details of the camshaft driving pinion.

The valve springs are adjustable for strength; the upper ends of the valve stems are screw-threaded, and conical-based nuts are used in lieu of the cotters with which motor cyclists are familiar; the conical bases of these nuts fit into cones in the spring caps. The pilot can grease his water pump whilst in flight by means of a ratchet greaser with flexible wire control. The carburetter is quite commonplace, being of the two-jet type, with a suction valve for the admission of extra air. Its chief features are the mounting of the throttle barrel upon ball bearings, and the fact that the main air intake draws its air from the inside of the crank case.

The engine consumes rather over nineteen gallons of petrol per hour on full throttle, and about a gallon and a quarter of oil.


Sectional view of the carburetter. The main jet is situated in the centre of the intake inside the choke tube. The float chamber is of the ordinary balanced needle valve type.

Speaking at King's College, London, Sir William M. Ramsay recently said that the doctrine that a university was a nice place to send a young man to spend the most critical years of his life in doing as little as possible ought to be recognised as a danger to the State. Only through some great disaster could the nation have the lesson forced upon it. "So I ceased to be a lecturer on Latin," he added, amid laughter, "and began to lecture on aeroplanes." Such sentiments are commendable, and worthy of imitation.



THE DISABLED AND THE MOTOR CYCLE

Some Notes by a Humber Owner who began his Motoring while suffering under the Disability of having only One Leg.

It is unfortunate, but nevertheless true, that after the war we shall see many motor cyclists (who, before disaster overtook them, were dauntless and daring riders) adapting mounts for use with maimed limbs, and doubtless we shall continue to receive, in gradually increasing numbers, queries from lame men who have never ridden a motor cycle but who will be desirous of taking up the pastime. As matter pertaining to motor cycling for the maimed will be of interest to this unlucky section of enthusiasts, we publish the following notes and sensations of a lame man on first mounting a motor cycle. On March 29th last we comprehensively reviewed mounts well adapted for the use of the disabled.

IT was during 1911 that I first thought of taking up motor cycling. Five years previously I had lost my left leg, with the result that I have to hobble through life with an artificial fitment, which naturally is a serious handicap as regards getting about. One day early in the winter of the abovementioned year I was walking down the main street of my own town when I noticed a Humber motor cycle and sidecar standing outside a tradesman's shop. As I approached the outfit the owner emerged from the shop entrance, and, walking up to the machine, immediately started it by the application of a starting handle to the back wheel. The whole performance struck me as so simple that I returned home with my mind made up. It was the beginning of winter, so I postponed matters until the following spring, when I sent to the Humber Co. for their 1912 catalogue. On receipt of this I found that sundry improvements had been made since the manufacture of the model I had examined, so that I decided straight away to buy a 1912 3½ h.p. two-speed handle-starting Humber.

Ere I had given the order an advertisement appeared in *The Motor Cycle* of a 1912 two-speed Humber with light wicker sidecar, which had been about three hundred miles, and could be seen in my district. I immediately answered the advertisement, made an appointment, and finally had a trial run in the sidecar.

Altering the Gear Controls.

I knew nothing about motor cycles at the time, but had sense enough to realise that the engine pulled well, and that all working parts seemed to be in satisfactory order. The result was that I took the machine home with me that evening, and promptly discovered that the sidecar would have to be detached in order to allow the outfit to pass through my side entrance gate. Fortunately, the sidecar was of the quick-detachable variety, and it was only three minutes work to remove it from the machine. Now, having made my purchase I was faced with the problem of altering the gear controls to suit my purpose. Being handy with tools, I decided to do the work myself, and, as the machine is now rather old and somewhat out of date, I will not burden the reader with a detailed description of what was done. The foot controls, of course, had to be revised, and when I had finished they were arranged as follows: On the front of the right footboard were the low and high speed pedals, and near the back of the footboard was the back brake lever. I found it quite a simple matter to carry out these alterations, and, as the machine has now been in use for nearly six years, with the alterations still good, the adaptation may be regarded as a success.

The First Ride.

On the following day I took my first ride. It was a glorious day early in April, and having pushed the motor cycle and sidecar on to the road and screwed up all the couplings (which, to my pleasant surprise, was a less serious task than I had imagined), I was ready to start up the engine, which I found quite simple, owing largely to the half-compression device. In mounting the machine I found the most convenient way was to lift my artificial leg over the tank, and that the most comfortable position while mounted was afforded by having the leg quite straight and resting on the front arm of the sidecar. Thus, having arranged myself, I proceeded to engage the low gear, and the machine glided away as smoothly as the one I had observed in the thoroughfare.

I am afraid my abilities are not sufficient to attempt to describe the pleasure of that first run. I do not think I shall ever forget it. Imagine what it meant after being limited to walking about two miles an hour under the most trying circumstances to be able to fly along the road with neither effort nor discomfort. I remember laughing aloud to myself, feeling naturally overjoyed at the great discovery I had made, and it was not until I had covered fifteen miles that the thought occurred to me to return. Accordingly, I throttled down the engine and engaged the low gear. I then managed to turn within the width of the road without dismounting, and returned home by the same route, where I found my wife waiting anxiously at the gate, thinking something must have happened. Indeed, something had happened. I had learned in the last hour something

The Disabled and the Motor Cycle.—

that may conceivably add years to my life. The following day I was out again, this time accompanied by my wife in the sidecar, and since then we have travelled many thousands of miles together. I may say that the machine has given an absolute minimum of trouble, and I have never been held up on the road with anything more serious than a choked jet or a puncture. Although I am so seriously handicapped, I have experienced no insurmountable difficulty.

In conclusion, I would like to advise all those who have lost a limb, as I have done, to take up motor cycling as a means of getting about. It makes very little difference which leg is missing, as most makes of machines can be adapted to overcome one's infirmity. Those having lost a right leg would have to dismount, of course, to operate the kick starter, which in all cases must be depressed with the natural foot. I am sure that motor cycling would give pleasure and help to thousands of disabled men who might never have thought of indulging in such a pastime.

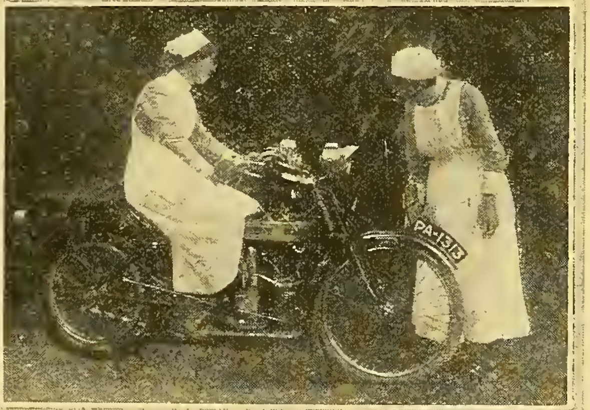
With the sidecar the outfit is quite rigid, and perfect safety can be enjoyed. I may add that I have found motor cycling a most health-inspiring recreation, and my wife and I have enjoyed very much better health since taking it up. F. W. PITHERS.

THE TOP GEAR MACHINE.

A Plea for a Higher Top Gear Ratio on Powerful Sidecar Machines.

AMERICAN car practice has produced a general striving among manufacturers in the direction of a top gear machine, which is a state of affairs I heartily regret. I have recently been riding a powerful twin fitted with a standard gear ratio of 5¼ to 1. This machine will thump over the summit of Edge Hill on its top gear, which, far from being a praiseworthy feat, seems to me merely to indicate that the top gear ratio is absurdly low for the normal conditions of riding, *i.e.*, during ninety per cent. of one's time one is called upon to tolerate high engine revs. and low road speed simply for the sake of climbing such hills as Edge on top!

Anyone who has watched the trend of design will have observed this general tendency in the direction of lower gear ratios for the last four or five years. In some cases it is frankly admitted by manufacturers that they have adopted low top gears simply on account of harsh transmission systems, it having been found that the short belt drive or all chain was appallingly snatchy if a fairly high gear ratio were used, whereas this defect was not so noticeable with a 5 or 5¼ to 1 ratio; but in the majority of cases the main aim has been a "top gear machine."

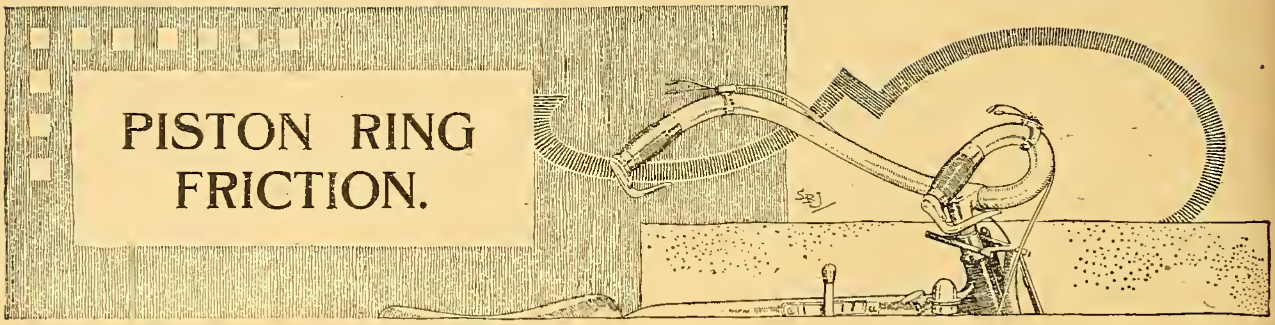

THE OFF-DUTY HOUR.
Nurses find interest in the doctor's Douglas.

A Comparison.

Now for vehicles of the Ford stamp, to be driven by all sorts and conditions of humanity, this top gear principle is excellent, but the average motor cyclist is a fairly intelligent individual who is anxious to get the best out of his machine, and is quite capable of using a gear box effectively. True, it is pleasant to be able to take all hills on top, but this can only be done at an immense sacrifice in comfort and in the way of speed on the level. The last big sidecar machine I owned was a Zenith Gradua, with a top gear ratio of about 3.5 to 1, and the way that machine floated over hill and dale was most delightful. In the interim I undertook a journalistic test of a chain-driven machine of the same power, having a 5 to 1 top and a big drop down to middle. Though the engine was a good one in every respect I was simply appalled by the clatter and revs if one attempted to open the throttle on the level. Though there was nothing to choose between the two engines, the Zenith had the chain-driven machine beaten in every way—comfort, speed, cool running, and petrol and oil consumption—owing solely to its high top gear. Most big sidecar machines are impossible as solo mounts chiefly on account of their gear ratios, and recently I found that a 2½ h.p. two-stroke lightweight was actually faster than a certain 5-6 h.p. twin solo! Even when riding in a mountainous district I have found a 4-1 top gear preferable to a 5-1 on a 7 h.p. sidecar twin.

What brought this point to my mind more forcibly than anything was a recent run accompanied by a 10 h.p. Singer light car. On the level I was easily left, but on hills my 4 h.p. sidecar was faster than the car—it being borne in mind that the weight h.p. ratio showed considerably in my favour. That the car was faster proved conclusively that my mount was too low geared for all-round efficiency.

Let us do away with this top gear notion; let us have four speed gears and use them. Every owner of a speedy light car knows that half the pleasure of driving is in "keeping up the revs" by artful handling of the change-speed lever. There is very little pleasure in driving a low-geared flabby-engined American car if one is used to a hot-stuff Britisher, and exactly the same applies to motor cycles. Most riders are willing to sacrifice the very occasional advantage of being able to climb a stiff gradient "on top" in order to gain the comfort and high speed a high gear ratio permits. CHINOOK.

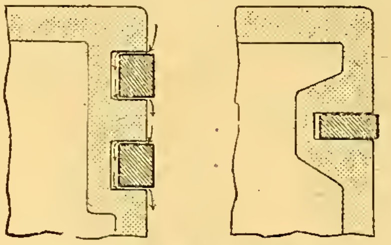


PISTON RING FRICTION.

SOME SUGGESTIONS IN CONNECTION WITH HIGH-SPEED ENGINES.

With the high-speed, highly-efficient, twin-cylinder engine of the future—for this type promises to be widely popular for solo use—piston ring friction must be taken seriously into account. With the ordinary touring engine, such as the popular 3½ h.p. single, designed to pull hard at comparatively low speeds, it does not matter a great deal whether two, three, or even four piston rings be used, or whether they be wide or narrow, but with the high-speed overhead valve engine we are up against an entirely different proposition. With this latter unit the rider is called upon to obtain his power at all times by means of "revs." Instead of plugging up hill with his engine turning over at, say, 1,500 r.p.m., he changes early and ascends with an engine speed of probably something well over 2,000 r.p.m. Also the efficiency engine runs comfortably on the level at a much higher rate of revolutions than the more ponderous variety, with the result that its all-round speed during the ordinary course of touring is probably 1,000 r.p.m. higher than the touring unit.

Now the piston losses due to the rings go up enormously with the speed, therefore the loss by friction (particularly oil friction) in an engine designed to run normally at high speeds is an infinitely more important matter than in the case of a low-speed engine. Indeed, it is a point of such great importance as to make good comparative petrol consumption impossible in the case of the high-speed engine if the piston and rings be badly designed.



The section on the left indicates how leakage past the rings most commonly occurs, while on the right is shown a type of ring which would not only tend to reduce this leakage, but to prevent friction.

An Undesirable Design of Ring.

The days of three and four piston rings are, fortunately, past—indeed, it is a moot point whether or not piston rings might be entirely dispensed with when the coefficient of expansion by heat in the cylinder and piston is the same. It is not generally known that a sleeve-valve car engine having no rings underwent a most searching test at the hands of its makers, and emerged with flying colours.

Supposing that we are to have steel cylinders and aluminium pistons, then we *cannot* dispense with rings, but what we can do is to abandon old ideas and pay more serious attention to the matter of friction, it being borne in mind that piston ring leakage goes down as the speed goes up, while friction goes up with the speed. Therefore in a high-speed engine it pays to sacrifice a little compression if by so doing we can considerably reduce friction. In the past we have used wide rings of shallow section, but these have proved imperfect in several respects. Every rider delights in finding his rings brightly burnished all the way round, but in point of fact this state of affairs does not in any way prove that no gas is escaping past the rings. The amount of gas which, at the worst, escapes through the film of oil between the ring and the cylinder is infinitesimal compared with the leakage that takes place *round the back of the ring*—this having been proved by practical research.

The wide, shallow ring is undesirable, then, because it presents a large surface to oil resistance, while its width is entirely unnecessary so far as its pressure retaining qualities are concerned. If it were half the width and double the depth it would do its work much better, for it would then obstruct leakage in the direction in which leakage is most probable, while still doing all that was necessary in the way of preventing leakage down the cylinder face. Moreover, the narrow and deep ring wears considerably better than the wide ring, and so does the slot carrying it, for the simple reason that, both the slot and the ring being deep, they are better able to resist the constant hammering effect of the reciprocating piston.

The Ringless Piston.

We have it, then, that the narrow and deep section ring is preferable to the wide and shallow variety in that, not only does it present a reduced friction surface (taking it that the tension of both rings is the same, oil friction will be reduced), but also it is better calculated to hold pressure. The objection to narrow rings is, I admit, their scraping effect on the cylinder, but this disadvantage could probably be ruled out by a judicious selection of metals.

What we shall probably come to in the high-speed engine for solo use is the employment of one top ring in a rather slack piston, with possibly a phosphor bronze oil scraping ring at the bottom of the piston. (We must not, of course, follow aero engine practice too closely, for here no pretence is made at efficiency, but it may be mentioned *en passant* that the piston

iston Ring Friction.—

learance on most aero engines is enormous.) Pos-ibly the single compression retaining ring will be of he obturator variety, but certainly it will not be of he old wide and shallow type.

Incidentally, it may be mentioned that if the narrow, leep section ring here advocated were employed in wo-strokes, we should experience less trouble with he top ring gumming (or welding) up—the gumming eing largely due to the escape of hot gas round the ack of the ring.

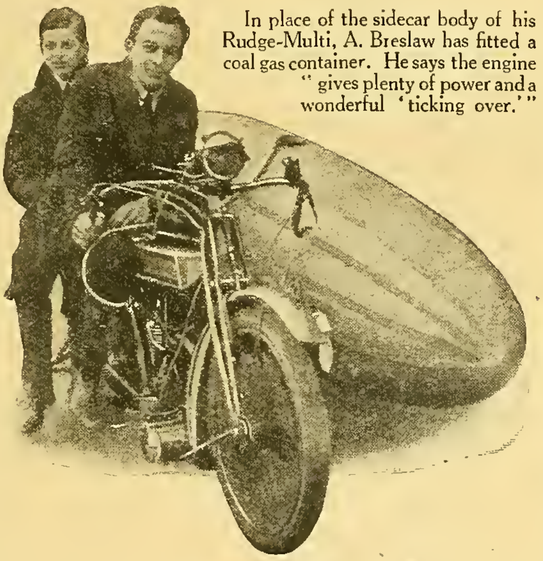
But, so long as we employ metals in two-strokes the eat expansion of which permits it, why not dispense with piston rings entirely? This really is what it comes to in practice, for the chief compression retainer is gummed in the groove during half its working career, with the result that it might as well be done away with altogether. It would not be difficult to design a piston which would retain compression reasonably well without rings (better, at any rate, than an ordinary piston with rings gummed up). The two-stroke is supposed to be the simplicity engine; why not make it truly simple, for riders of two-strokes do not demand vim, ginger, and m.p.h. so much as they demand an absolute no-trouble mount which can be ridden months on end without engine attention. CHINOOK.

COAL GAS IN PRACTICE.

A Continuation of our Notes founded on the Daily Use of Coal Gas.

WE stated in some previous Notes that, using coal gas as a fuel, we found that less lubricating oil was necessary than with petrol, owing to the lower explosion temperature. This indeed applies so long as scrupulous care is exercised in feeding the correct mixture to the engine; but it is an exceedingly easy matter, with the crude methods usually employed, to feed an incorrect mixture with no knowledge of the fact till the engine itself gives warning.

During the recent frosty nights our journeys home have been cut as short as possible by the simple expedient of turning on the gas tap and opening wide the throttle, and on several occasions after riding hard for about four miles we noticed a periodical choking and misfiring of the engine, which was put down to a kink in the gas pipe, and passed unheeded. Finally, however, it became so noticeable that we glanced down at the engine, and were somewhat disconcerted to see that the exhaust valve cap of the front cylinder, and indeed the whole valve pocket, was glowing a bright red.


In place of the sidecar body of his Rudge-Multi, A. Breslaw has fitted a coal gas container. He says the engine "gives plenty of power and a wonderful 'ticking over.'"

This same engine has been driven fully out on long journeys on petrol without indicating the least symptoms of overheating, and it is a curious fact that, even with coal gas as the fuel, overheating caused by an incorrect mixture would appear to occur only in frosty weather.

The effect of the atmosphere upon the engine with coal gas as the fuel is much more noticeable than with petrol. On and about sundown marvellously good results are generally obtained, the engine pulling almost as well as on petrol, while at other times top gear work, even on the level, is apt to be laborious, though the speed is fair.

NEW YEAR'S HONOURS.

The Order of the British Empire bestowed on Familiar Figures in the Motor Cycle World.

AMONG those who have received the various grades of the Order of the British Empire we notice the following, who are well-known in motor cycle circles: Mrs. Locke-King, vice-president North Surrey Division and Assistant County Director (Surrey) British Red Cross Society and the Order of St. John of Jerusalem, to be a Dame (D.B.E.) Mrs. Locke-King is the wife of the proprietor of the Brooklands Track, a keen motorist, and on many occasions an interested spectator of the various B.M.C.R.C. meetings. Mr. T. O. M. Sopwith, C.B.E., was an enthusiastic motor cyclist in his early youth, and is now the manufacturer of the well-known aeroplanes bearing his name. Mr. P. G. L. Webb, C.B.E., Deputy Controller of the Petrol Department of the Board of Trade; Mr. W. L. Baylay, O.B.E., manager of the Birmingham Small Arms Co., Ltd.; Major Charles Jarrott, O.B.E., Inspector of Mechanical Transport, R.F.C., the well-known motorist and president of the Motor Cycling Club; Mr. Alfred Bednell, O.B.E., general manager of the Cycle and Motor Cycle Manufacturers' and Traders' Union; Miss Henrietta Christabel Ellis, O.B.E., Commandant of the Motor Transport Section of the Women's Legion; Mr. H. W. Cole, M.B.E., Chief Clerk of the Petrol Controller's Department of the Board of Trade; Mr. A. F. Ilsley, M.B.E., Assistant Secretary of the Iron and Steel Committee, and secretary of the Engineering Committee, and a director of Phœnix Motors, Ltd.; Mr. Charles Temperley, M.B.E., Commandant and Transport Officer of the Metropolitan Special Constabulary.

CURRENT CHAT

Times to Light Lamps.

GREENWICH TIME.

Jan 17th	... ...	4.50 p.m.
,, 19th	... ...	4.54 ,,
,, 21st	... ...	4.57 ,,
,, 23rd	... ...	5.0 ,,

The National War Funds.

The National Relief Fund (distributed £3,773,877)	£6,320,363	0	0
British Red Cross Fund	8,758,748	5	11
Tobacco Fund	146,740	0	0

Storing a Machine.

A great number of readers are now storing their machines for an indefinite period, and we are receiving numerous letters asking for hints as to their preservation. One point we would particularly recommend readers to make sure of is that the tyres are not rusted on the rims; if so, remove the tyres and shellac the rims, otherwise the tyres will soon rot through at the beading. It is best to hang the tyres separately over a well-padded support.

Preventing Cylinder Rust.

As regards the cylinders rusting, this should be carefully guarded against both internally and externally. The engine should be flooded with oil before leaving, run for a few minutes so as to distribute the oil over the combustion head, and finally left with the valves closed.

Greasing.

A convenient way of inducing the grease to enter all the crevices is to dissolve the grease used—say vaseline—in petrol, and apply with a soft bristle paint brush.

Lighting.

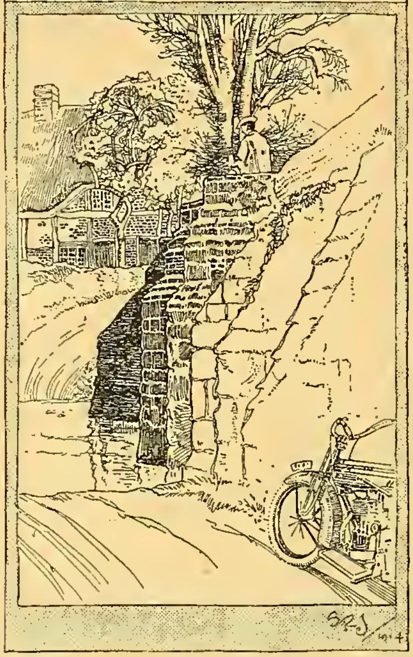
Numbers of letters continue to reach us suggesting means of overcoming the electric wiring problems advanced by "Chinook."

Motor Cyclist's Presence of Mind.

A motor cyclist, John Walker, licensed victualler, Old Kent Road, S.E., at Greenwich County Court last week, sued the owners of a car for damages through collision, negligent driving being claimed on the part of the driver—a boy of fourteen.

"One of the Oldest Motor Cyclists."

Plaintiff in evidence stated: "I saw it was impossible to avoid collision, so sat tight and received it. I was thrown into the road and the front of the machine telescoped. I said to the driver, 'What made you do such a silly thing?' He replied, 'It was all my fault, sir.' He was then taken away on the ambulance." Cross-examined, he stated that he was 'one of the oldest motor cyclists, and was not exceeding 12 m.p.h."



The Second-hand Market.

It is a surprising fact to us that the market for second-hand machines still remains lively. A member of our staff, on advertising a luxurious outfit at a price exceeding 100 guineas, promptly received a number of enquiries, mainly from doctors and mill owners.

More Humour from Queries.

Certainly the editorial life is not all beer and skittles, but we do have our little jokes sometimes. As we have said on more than one occasion, the most frequent source of laughter in the frigid gloom of our sanctum—where the temperature seldom exceeds zero in winter, and just as consistently keeps above blood heat in the summer—is the delightfully unconscious humour shown by many of our correspondents. One of our letters recently contained a P.S. to the effect that we need not trouble to type the answer, and that a piece of paper was enclosed for us to write on! And sure enough the querist was as good as his word, and had enclosed a piece of paper for us "to write on," as well as the stamped addressed envelope for reply!

Queries—Real or Faked?

And on top of a thing like this we meet a friend who calmly says he was always under the impression that the queries we publish all emanate from the office! In other words, he thought we had nothing better to do than make enquiries for the sake of answering them!

Special Features.

PISTON RING FRICTION.

THE DISABLED AND THE MOTOR CYCLE

THE DEVELOPMENT OF THE PASSENGER MOTOR CYCLE.

Some Schoolboy Howlers.

We think the youngster must have been a motor cyclist who, when asked to explain the force of gravity, said that it meant a limit of ten miles.

Another bright youth said, in his examination paper, that a vacuum was a place where the Pope resided.

Commandeering Laid-up Motors.

A common topic of discussion in motor car circles at the present time is, "Why do not the Government take over the thousands of cars that are now lying idle in their garages, and so save money, material, and labour from the production of new cars?" If the Government should wake up to the possibilities of this suggestion, could not the scheme also apply to some of the motor cycles now sharing the same fate as their larger sisters?

For the Italian Army.

We are informed that a number of Matchless motor cycles are under construction to the order of the Italian Government. The machines have been tested under the recent severe weather conditions, over ice and snow-bound gradients on the Kent hills, with ten degrees of frost. One machine was tested with three up.

"The Motor Industry."

Mr. Horace Wyatt, an old contributor to *The Motor Cycle*, who has made for himself a conspicuous place in the motor world, has published, through Sir Isaac Pitman and Sons, Ltd., a new and important work, "The Motor Industry." This is the latest addition to these publishers' "Common Commodities and Industries" series, which now comprises some five-and-twenty volumes. "The Motor Industry" begins by tracing the history and developments of the motor, and proceeds to illustrate the theme with descriptions and pictures of every type of machine from the practical traction engine at the one end of the scale to the most luxurious car at the other. Particular stress is laid upon the important part which the motor is bound to play in the future developments of trade and, in particular, of agriculture. Suggestions also are offered towards the advancement of this industry in Great Britain. The time is coming, indeed has come, when every nerve must be strained by the people of this country to win a foremost place in the competition of the nations.

al Gas as a Fuel.

We are informed that the Order affect- g the control of the use of coal gas will ot come into operation until the 1st of ebruary.

he New Year's Honours.

In the list of New Year's honours we ote the names of Mr. P. G. L. Webb, eputy Controller, Petrol Controller's epartment, and Mr. H. W. Cole, Chief lerk of the Department, who have re- eived the Order of the British Empire.

otorists' Protection Association.

An association having for its object he protection of the private motorist as recently been suggested in London. he secretary *pro tem.* is Mr. H. E. anderson, Sussex House, 42, Howard oad, South Norwood, London, S.E.25, nd any reader interested in the scheme s advised to put himself into communica- ion with Mr. Sanderson.

till More Aeroplanes Wanted.

Sir Douglas Haig, in reviewing last ear's fighting, said : "The enemy shows o sign of relaxing his endeavours in this epartment of war. While acknowledg- ng, therefore, most fully the great effort hat has been made to meet the ever- ncreasing demands of this most impor- ant service, I feel it my duty to point ut once more that the position which as been won by the skill, courage, and evotion of our pilots can only be main- ained by a liberal supply of the most fficient machines."

or the Disabled.

The following donations have already een received in reference to the appeal ssued by the Central Committee for the mployment of Discharged Soldiers and ailors connected with the motor ndustry:

The B.S.A. Co., Ltd.	£200	0	0
The Daimler Co., Ltd.	200	0	0
The National Society of Chauffeurs' "Sixpenny Fund"	150	0	0
The British Lighting and Ignition Co.	10	0	0
J. Lucas and Co., Ltd.	5	5	0
The East London Rubber Co. ..	5	5	0
The Coventry Chain Co., Ltd. ..	5	5	0
The Bowden Wire Co., Ltd. ..	5	5	0
The Day Motor Co., Ltd.	2	2	0
The British Chuck and Piston Ring, Ltd.	1	1	0
R. M. Wright and Co., Ltd. ..	1	0	0
	£585	3	0

ost-war Output.

In last week's issue of *The Autocar* 'Runabout" has some very interesting emarks to make on the post-war output f cars, and of light cars in particular. As the conditions in both industries are much the same, it may be taken that the substance of his remarks applies equally to motor cycles as to cars. It is "Runabout's" opinion—and "Runabout" is a man well able to judge, and one not likely to jump at reckless conclusions—that for some time after the war the demand for motors will be enormously ahead of the supplies, and consequently it will be some time before any noteworthy fall in the price of new cars becomes evident. "Runabout" has no hesitation in advising all who are likely to want cars after the war to place themselves on the waiting list of some firm, so that they may be reasonably assured of having their requirements met in a reasonable time.

The Waiting Lists.

It is common knowledge that several of the more prominent car manufacturers have their total output booked up for some two or three years after the declaration of peace.

The Ramsey Oil Find.

Many of our readers will have seen that the Ramsey oil find has been explained away by being attributed to leakage from a tank. It has been suggested in some quarters that this explanation may be due to a desire on the part of the Government to prevent the discovery of any oil in the country. We offer no comment on this suggestion, but it seems rather at variance with the recent Government decision to prospect for oil in these islands on a large scale.

A Draw for War Bonds.

Taking advantage of the custom of Christmas "draws" which is so prevalent in most large works, the Dunlop Rubber Co. gave their employees an opportunity to participate in a draw for War Bonds instead of the usual prizes.

The scheme was put through in a week from start to finish, and £514 was raised in shilling tickets. The first prize was forty per cent. of the total subscriptions, and other prizes worked down the scale to complete the total amount subscribed.

A Motoring School for Prisoners of War.

We recently mentioned the formation at Vevey of a motoring school for British interned prisoners of war invalided from Germany to Switzerland. This school is under the control of Lt. Wallis, late of the staff of *The Autocar*. Subscriptions to enable Lt. Wallis to carry on his excellent work are needed, and any reader who is willing to assist this most praiseworthy scheme should send his subscription to the Editor of *The Autocar*, Hertford Street, Coventry. The work and progress of the school are periodically described in *The Autocar*, and an interesting page is devoted to the school in last week's issue.

The Consolidated Petrol Order.

Any reader who wishes to have the full terms of the new Petrol Order for purposes of reference will find them in *The Autocar* of January 12th.

The R.A.C. of South Africa.

The R.A C. of South Africa, like the home body, is doing a considerable amount of work in the transportation of wounded soldiers, both with cars and motor cycles.

A Striking Car.

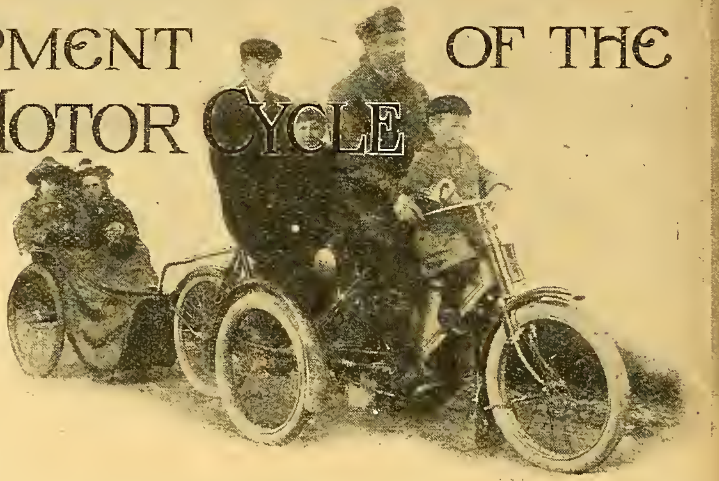
One of the most original and striking cars that has ever been designed is the Fergus. This car originated in Belfast, and was on view in Coventry in 1914, but, owing to the war, its manufacture became impossible. Mr. Ferguson, the designer, took his patents to America, and it is interesting to know that this car is now being launched on the American market. The car bristles with novel features, the most striking of all being that the car requires practically no lubrication for months on end. If this object can be achieved in a car, why should it not be equally attainable in the case of a motor cycle?

Testing Military Motor Cycles.

The illustration on this page is of Triumph machines undergoing official test prior to their final acceptance for the army. Each machine is ridden by an officer, chiefly to ensure that it is developing its full power, though sometimes a cross-country jaunt, including hillocks and ditches, is indulged in. On the right are the two official testers, while on the left a Triumph tester is in the act of returning to the works with an accepted machine. He then returns with a fresh mount, each tester bringing three machines for examination.

Triumph machines being tested by Government officials (see paragraph).

THE DEVELOPMENT OF THE PASSENGER MOTOR CYCLE



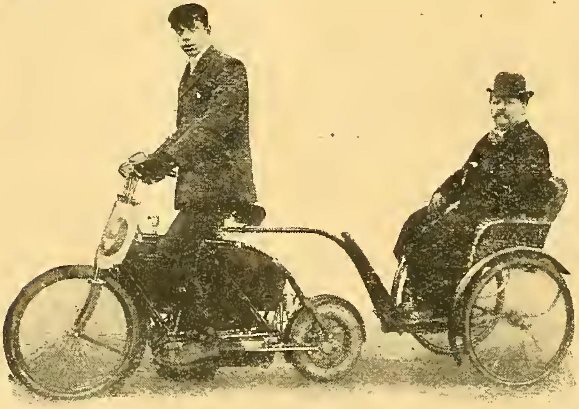
So far as motor cycle practice is concerned, the tricycle, to which was attached a trailer, was the first method of carrying an additional passenger, The illustration shows a tricycle with an extra wheel at the rear as well as the trailer. Considering the power of the engine, presumably about 3 h.p., the load is considerable.

THE GENESIS OF THE SIDECAR.

IN the early days, when practically all motor cars struggled along under power derived from single-cylinder engines, the motor cycle was in such a crude state of development as to be almost truthfully described as non-existent. There were, however, attempts at making light passenger-carrying vehicles running on four wheels, and following much that afterwards developed into motor cycle practice.

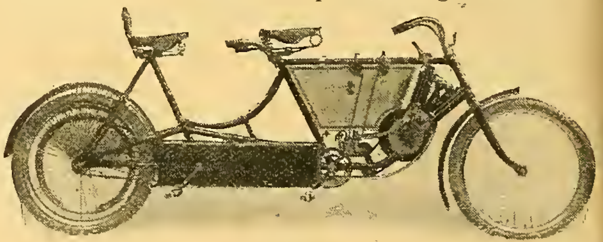
With the exception of the old Bollée and Century tandems, indications point to the De Dion tricycle as one of the earliest attempts at passenger carrying. To the best of our recollection, the trailer was introduced in Paris as an adjunct to the De Dion tricycle. The trailer was followed by a forecarriage attachment which was nothing more or less than the fitting of a trailer body in front of the tricycle, removing the front wheel, adding a pair of steering wheels, and connecting the front fork end of the tricycle to the steering arms of the forecarriage wheels. This type was followed by an *unconvertible* four-wheeler known as a quadricycle. These four-wheelers first appeared in this country at the Stanley Show of 1899, being exhibited by the Ariel and Enfield Companies. These models competed in the famous R.A.C. trials of 1900.

A few half-hearted attempts were made to market a tandem lady-back motor cycle, and some of these machines were to be seen on the roads as late as 1911. They were, however, never an unqualified success, one of the most obvious disadvantages being the liability to serious sideslip.



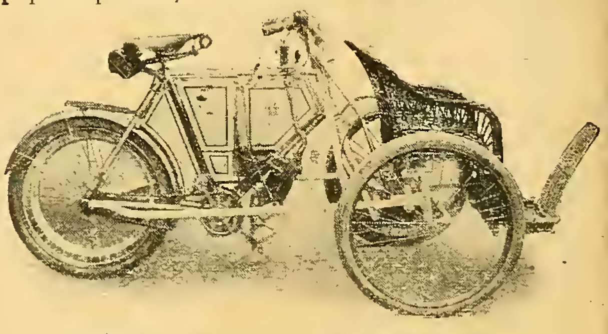
The motor cycle and trailer succeeded the tricycle and trailer in natural sequence, and had considerable popularity in 1902 and onwards. The photograph shows the Holden motor cycle, which had direct drive to the rear wheel.

In 1903 a new type of passenger machine made its appearance in the shape of the Singer and Phœnix tricars, which were soon followed by the productions of the Rex and Humber Companies along similar lines.



The tandem motor cycle. This type of passenger-carrying vehicle had but very short vogue. The position of the Clement-Garrard engine and the small angle at which the cylinders are set are noticeable features.

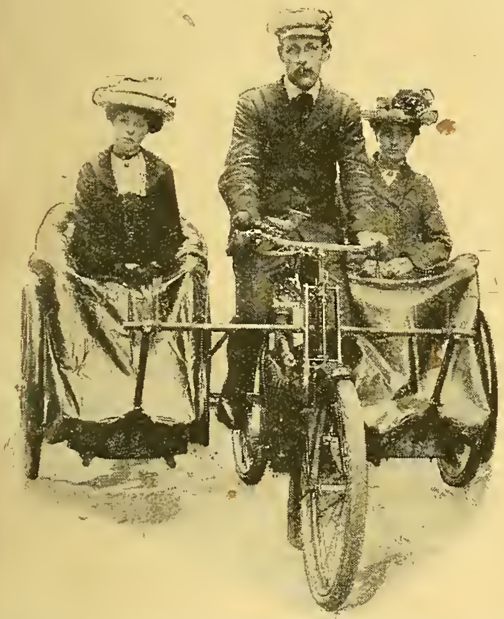
These tricars generally consisted of a motor cycle from the handle-bars rearwards, with the single front wheel replaced by a pair, between which the passengers' seat was arranged. The illustration given is of the Phœnix Trimo, which was, of course, a deservedly popular pioneer, and did invaluable work.



The Phœnix Trimo, a type of tricar in evidence in 1902-3.
The power of the engine is 3¼ h.p.

he Development of the Passenger Motor Cycle.—

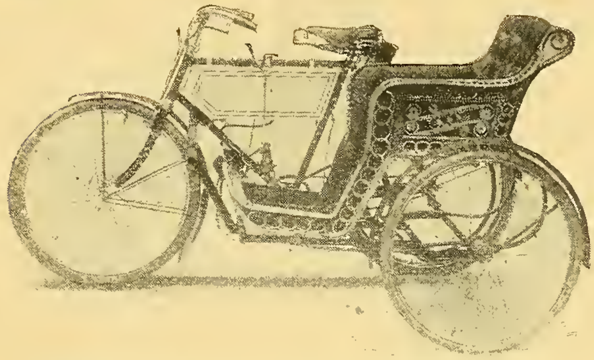
In the same year (1903) the first trailers attached o cycles were seen on the road. The main point in ll these arrangements was simple and easy detachbility, so that the machine could be used either for assenger-carrying or for solo use without the expendiure of much labour in the conversion. The removing f the forecar obviously left much to be desired, and n 1903 the makers of the Ariel motor cycle marketed he "Liberty Sociable Attachment," which, so far s we are aware, was the first sidecar to be put upon he market in any quantity. It was made under icence by the firm now known as Components, Ltd., aving been invented by the brothers Graham some ine months previously. It is of considerable interest o note that Messrs. Components, Ltd., allowed the atents to lapse, as they thought the future of the idecar to be so unpromising! Had they preserved their rights they would have drawn a royalty on every sidecar made since! Mr. Montgomery, the well-known sidecar manufacturer, tells how he vainly tried to convince Mr. Sangster, of the Components Co., that the sidecar *had* a future.



A type of passenger machine which, for obvious reasons, never "caught on," although now and again, even in these enlightened days, letters are received asking why a sidecar should not be placed each side of the motor cycle.

In *The Motor Cycle* of this year (1903) a most interesting article appeared, reviewing the experiences of "trailering" as it was called, and it gave several hints and tips as to what machines would be most suitable and what should be avoided for the job of carrying a passenger; 2 h.p. was recommended as satisfactory and 2¾ h.p. as ample. If, however, a two-speed gear were fitted, 2 h.p. would be adequate for any serious touring!

The gap between these ideas and those of the present day is too obvious to need elaboration. Further advice given was always to start downhill, while the writer of the article in question stated quite barefacedly that the question of sociability was not at all important, as the machine took so much looking after.



The Ariel sidecars were among the first used on the road. The engine is a 2 h.p. Minerva "Spray."

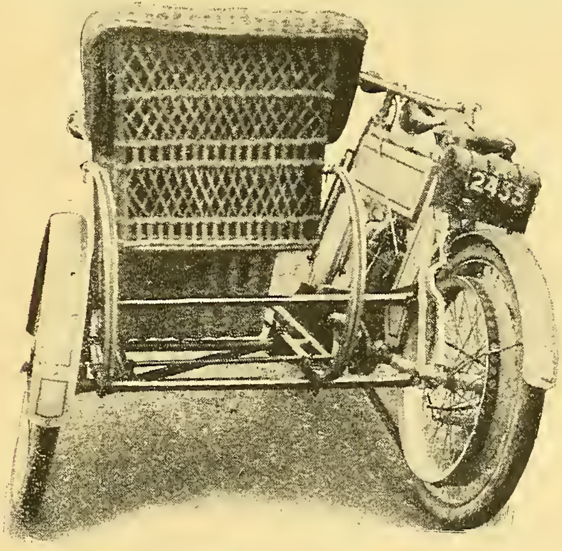
The passenger, who also gave her experiences, recommended to other passengers that they should always take a book, so that in case of a breakdown they would have something to pass the time away while the machine was being repaired.

Other Sidecars.

The coming of the Liberty sociable attachment apparently set others thinking, but which form of passenger attachment would ultimately win the day was as yet far from being a decided question, and in 1903 Messrs. Mills-Fulford introduced a new sidecar which could be converted into a trailer at will. Further evidence of the uncertainty obtaining as to which machine would ultimately come out on top is afforded in *The Motor Cycle* so late as 1905, where there is a statement to the effect that the tricar had not yet completely ousted the sidecar!

Rear Cars.

Many of our readers will doubtless remember that within the last few months particulars of an American contrivance called the Cygnet Rear Car, and an English arrangement on similar lines called the Backcar, have been published in *The Motor Cycle*. The accompanying illustration shows two sidecars coupled



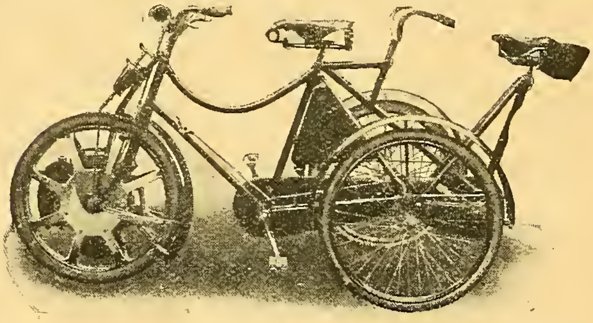
The flexible type of sidecar had many admirers at the time of its inception. Its peculiarity was that the body remained vertical even though the cycle might be leaning over. The illustration gives a good idea of the movement.

The Development of the Passenger Motor Cycle.—

to the motor cycle on either side in the usual way in front, and coupled to it and *via* the motor cycle frame to each other behind, an arrangement that rather suggests the rear car attachment. Several ideas were put on the market on similar lines in these early days, but this is the earliest, and to the best of our knowledge the closest, forerunner of the new rear car arrangement. But in the same year the Kyma sociable made its appearance. This machine is quite unique, but as the illustration shows practically all that is of interest, it may be passed over with a remark or two emphasising a few salient features. For instance, a popular subject for discussion in cycle car circles when cycle cars were making a fresh struggle for existence in 1912 and 1913 was the question of transmission, and several successful machines, notably the G.N., were put on the road, provided with chain drive from engine to countershaft, and thence belts to the rear wheels. It will be seen that the Kyma three-wheeler has this arrangement. The radiator fitted is no clumsier than were most radiators at the time.

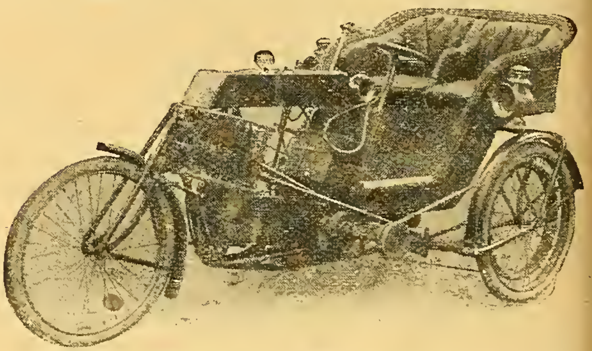
The Flexible Sidecar.

About this time a fresh type of sidecar made its appearance—in the shape of the flexible. As this is now practically extinct, some new readers, perhaps, may be surprised to hear that it was specially arranged so that the cycle could lean at an angle when taking corners, just as if it were ridden solo, while the body of the sidecar remained upright. Although such a device as this was on the market as early as 1903, the illustration is the earliest available, and is taken from *The Motor Cycle* of June, 1905. The flexible sidecar died a natural death, but there is no doubt that it had many advantages in riding. Its main drawbacks were, of course, that the combination was just as liable to skid as was a solo machine, and also when standing the motor cycle had to be raised on to the stand, just as if no sidecar were attached.



The Singer "trike" had the power unit in the front wheel. Accommodation was provided for the passengers by fitting a second saddle at the rear, together with a pair of handle-bars.

Even so early as 1904 the tradesman's sidecarrier was on the road, although, of course, it is doubtful if this idea met with any considerable measure of success much earlier than 1912 or 1913. The tradesman's sidecarrier has gained enormously in popularity during the war, but it will surprise many of its users to hear that a specially constructed sidecar body for the carriage of goods was on the market so long as fourteen years ago.



The Kyma sociable, a curious passenger vehicle, seen on the road in 1903. It will be apparent that several modern features are incorporated.

Another ingenious device that attained a measure of popularity in these years of experiment and trial was a coupling for a push cycle and motor cycle. This consisted of several metal strips for the purpose of coupling an ordinary push cycle to a motor cycle, so that when together the pair made a compact four-wheeled vehicle. The passenger on the push cycle carried his or her hands on the handle-bar, but did not make any attempt at steering, which was left to the motor cycle rider. Several of these coupling devices were put on the market, the first probably being that by the makers of the first sidecar, and it went under the name of the Ariel coupling.

(To be concluded.)

* * *

SOME INTERESTING LEGAL CASES.

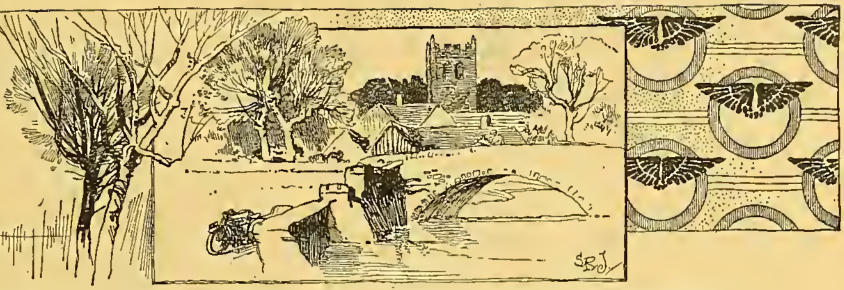
A SHORT time ago there appeared in *The Motor Cycle* an account of the work of the Auto Cycle Union during the war, and reference was made to cases in which the A.C.U. had been successful in helping members.

The following details of cases in which the A.C.U. was successful in defending several motor cyclists prosecuted under the new Order were furnished to us through the courtesy of Mr. Noel Berridge, of the Royal Automobile Club Legal Department.

At Sale, Cheshire, a motor cyclist was in the habit of riding his machine on business from his works, where he was employed as an electrical engineer, and also occasionally from home to the works. There was a tramway service, but he sometimes used the motor cycle if the trams were not running. On the particular occasion on which he was stopped he had taken the machine home for repairs, and was bringing it back to the works for use in the course of his business later on in the day. The case was dismissed.

In Birmingham, a soldier who had been discharged from the Army through ill-health caused by wounds was working at the factory of Messrs. Vickers, Aston. His ill-health contracted while in the Army caused him to suffer severely from heart-trouble. He was situated one and a half miles from a motor omnibus starting place, and found that waiting in a queue for a place in a vehicle aggravated his heart trouble, which also prevented him from using a pedal cycle. As the case rested upon the point as to whether he was justified in using motor spirit when an omnibus service was reasonably convenient the case was dismissed.

A TEARFUL GOOD-BYE.



How the Dust of the Highway was Responsible for Great Misunderstandings.

LOOKING back I remember a lighthearted band of about one hundred despatch riders starting for the Front. After weary months of training they raced off like hounds let loose from the leash. Equipped with brand new machines, they flashed through the villages, while folks came out to see and cheer them on their way. It was in the earlier stages of the war, when khaki-coated men on motor cycles were not so common as now. Like thorough sportsmen, they were eager to get out, so eager that, with heads bent low on the handle-bars and throttles fully open, one would have thought that the fate of our arms depended on their immediate assistance.

It was a glorious summer day. Clouds of dust, wafted by a gentle breeze, refused to settle, as if annoyed by the constant disturbance of the whirring machines.

At the first stop all was well. Hearts were too full and brains too excited to be troubled by such a trifling inconvenience as a bit of dust; but, at the second stop, amid a good deal of nose-blowing, complaints were made of the nuisance, and several with inflamed eyelids seemed rapidly to be developing violent colds in the head. But what is dust to men about to face shells, gas, and bullets?

At the third stop the growl was distinct and ominous. Men without goggles blamed their carelessness, while men provided with them found fault with their quality. This dust was not the ordinary sort. It not only penetrated through goggles of the most approved design, but was impregnated with tar, or creosote, or some vile preparation used in repairing roads. The irritation when it got into the eyes was considerable, and for a time the sufferer was partially blinded. A very different looking lot of men from the merry band who started were these when they arrived at the port of embarkation. Tear-streaming and swollen-eyed they might have just come from the inspection of a pickled onion factory.

A Sympathetic Crowd.

A curious, yet sympathetic, crowd assembled round the weeping warriors. Kind ladies remarked, "Poor dears, how sad for them to have to leave their wives and children!" Men bit their lips and choked back their tears, but the temporary check only served to double the violence of the outburst.

The juvenile portion of the crowd would insist that they were returned wounded heroes still in the throes of agony. An urchin asked one more tearful than the rest if he had been gassed. The reply sent the youth away reflecting whether he had heard aright, or that the flood of language was attributable to the same cause as the other overflow.

Long queues of sufferers for eyewash treatment formed outside the local chemist shops. It was a regular sick parade, and the youngsters, now fully convinced as to the real status of the soldiers, asked for French souvenirs. The treatment only gave temporary relief, and the scorching sun was intolerable. All sought any available shade that could be had, and the very fact of men shading their faces with their hands must have given the impression that they were trying to hide their weakness from observation. The sergeant-major, shedding bitter tears, announced that the men would receive pay before embarking. Never before had he shown publicly how affecting it is to have to call a pay parade, while the officer who sat at the pay table appeared quite sorry to part with so much money, as he paid with one hand and applied his handkerchief with the other.

The Strength of Circumstantial Evidence.

Old soldiers attempted to show solicitude for the younger men. One old veteran went up to an apparently heartbroken youth, and said, "Cheer up, son; don't take it too much to heart." "I ain't crying for that," indignantly returned the weeping one. "Never mind," added the other doubtfully, "you'll soon get over it." It was useless denying it, circumstantial evidence was too strong. Sailors remarked, jocularly, that the tide would not come in any quicker for the addition of a few extra drops of salt water. One man was so exasperated that he insinuated that the whole affair was a stunt of the authorities. He contended that they had been put purposely over a specially prepared course as an experimental test, and vowed vengeance on the perpetrators of the trick.

But the most humiliating scene occurred when the hospital ship arrived. The wounded Tommies thronged to her sides and cheered madly as they moored alongside the quay, but all the response they got was a choking sob or a feeble wave of a handkerchief, which could not be spared for long from its more urgent duties of tear mopping. Our broken and melancholy appearances must, indeed, have damped their spirits, for an atmosphere of oppression seemed to have settled on the whole vicinity.

At last aboard ship they left dock to the strains of—I believe the band played that pathetic melody, "Oh, dry those tears." I am not quite sure, because I was attending to my own troubles with a bottle of diluted boracic solution.

It was altogether the most tearful party I have ever witnessed, but the cool night and sea breeze soon eased the suffering, and next day a merry band was speeding along the long, straight, tree-lined roads of France.

L. J. WILLIAMS, SGT. R.E.

ADVENTURES WITH and WITHOUT LEAVE

How Fate oft dogs the Footsteps of the Over Ambitious.

THERE is a special animosity of fate seemingly reserved for those who desire to crowd the maximum amount of effort into the minimum time, and generally one stroke of ill-luck never comes without a second in its train—the reserves of misfortune's artillery, as it were, brought up in case the victim should survive the first shock.

The Imp of Perversity has nowhere shown himself so assiduously attentive as towards the men of a certain M.T. repair depot situated "at home," who, before the banning of "pleasure" motoring, were wont to snatch a few surreptitious hours with their families.

The working hours at this place permit the freedom of the staff from tea-time on Saturday until Sunday night, thus giving about thirty hours' time made precious by the fact that it is free from all military duties and obligations unless one happens to be detailed for "guard" or "fire picket," which occurs more often than not.

One could not fail to admire the pluck of those riders who accomplished runs of as much as 150 miles on oft-times disreputable old crocks in order to snatch a few hours with their people and then did the return journey against the clock, with "umpteen" days "C.B." overhanging as a penalty for unreliability of the machine—incidents which illustrate to what length a soldier will go in order to visit his people.

Such a fate befell two enthusiasts who invested a small sum in an antique one-cylinder car, with which, after much "tuning," they set out for their home, 110 miles away, one Saturday evening.

In the first mile the magneto chain broke, and after this was repaired the outfit did not exactly prove to be a Grand Prix racer; lamp troubles and minor defects resulted in a low average speed, whilst the engine gradually lost power as the miles went by owing to the spindle of the circulation pump having seized and broken, with the result that the water had mostly boiled away. They reached their destination at 2 p.m. on Sunday after a journey at the average speed of 7 m.p.h.!

The unfortunate sequel to the outing was the missing of the return train, and on arrival at their depot, three hours after *reveille*, the wayfarers were awarded fourteen days' C.B. by an unsympathetic C.O.

A curious chain of accidents happened to one machine, the joint property of three men. The first rider tried conclusions with a motor 'bus, and, although he was thrown clear, the 'bus passed over the carrier and rear wheel.

The next time the machine was on the road, the second of the three part-owners was travelling along at a good bat when he ran into a low mist, left the road, and, after a few lurid plunges in the grass, came up hard against a telegraph pole. He was able to continue an eighty-mile journey after a little rest to recover his sense of whereabouts.

The third man had the machine on the first week-end after the resetting of the clocks from "summer-time," and was hastening homewards with only the small light permissible in military areas, when, seeing what he imagined to be a dark patch of unrolled metal in his path, he steered for the narrowest part of it, and at once found himself describing a tremendous parabola through the air; he landed head first, but the stiff peak of his cap saved him from being knocked senseless.

It was some time before he recovered sufficiently to pick up his machine and discover that the object which had thrown him was a horse, sadly mangled, lying dead in the road.

A Thoughtless Omission.

The beat of an engine coming along the road at this moment caused our friend to gather his dazed wits and endeavour to stop the newcomer by violently rocking his handle-bars, on which the head lamp was still burning. The warning was just in time, and the rider pulled up within inches of the carcase; simultaneously, the lights of a car appeared in the opposite direction, and this was also stopped in safety.

It is awful to contemplate the possible consequences had the first motor cyclist remained unconscious and the second and also the car had all got mixed up together.

The arrival of a constable elucidated the mystery. The horse, straying on the road, had been run down by a motorist, who foolishly left it without any light or warning in order that he might advise the police of the accident, with the above consequences during his absence.

Adventures—with and without Leave.—

After an hour's rest and copious "injections" of stimulant, our friend was able to complete his journey of ninety miles, despite the fact that his left wrist was so badly sprained as to be useless.

One would imagine these misfortunes enough for one outing, but, on the return journey, the timing-shaft broke! A two-mile push to the nearest village, a five-mile walk to a main line station, and a skirmish with the "red-caps" brought the victim of misfortune back to barracks none the happier for his outing.

The above accumulation of trouble is almost equalled by the adventures of Private X——, who started one night on a brand new two-stroke for his home, some seventy miles away; he carried a spare tin of petrol, and in fifty miles this chafed through and allowed a steady drip on to the belt, thus distributing the spirit over the machine and rider until the rear lamp caught fire and the whole was rapidly ablaze!

Saving himself by rolling in the roadside grass, the unlucky X——, after watching his machine burn out, disgustedly walked to the next village, hired a pedal-cycle, and almost reached home, when, at the foot of a hill, he skidded, struck a wall, and hopelessly buckled the cycle forks, and was thus compelled to complete the distance on foot.

He was not "out of the wood," however, for, before departing from the bosom of his family, his adventurous offspring succeeded in pitching a stone through a neighbour's plate-glass window.

A Story with a Moral.

The concluding incident of this chapter of accidents occurred to the writer during a four-days' leave, and for convenience it may be told in the first person.

I was on a visit to a relative in an out-of-the-way Yorkshire village, and owing to the rain had been greatly troubled by belt slip, and so, for the return journey of thirty miles odd, decided to raise the gear. In endeavouring to loosen the pulley locknut with a hammer and chisel (foolishly over-confident of my old trusty Triumph I had started without any tools), I found that fifteen months of neglect had caused the part to become immovably rusted.

A hasty and injudicious blow and calamity! I had broken the pulley boss. Removing the pulley I set out on a two miles tramp, over fields sodden with incessant rain, to the nearest place where I could obtain a drill, and I there fixed the loose flange by means of three studs.

The repair was satisfactory, and, darkness approaching and having no lamps, I made good speed over the first six miles, when the belt broke; a rather short spare on the machine was only forced on to the pulleys with difficulty, and the strain proved too great, for after about fifty yards the pulley burst at the drilled holes into which the studs were fitted, and so I was completely stranded five miles from a station and twenty-four from home!

Rain, wind, and hills made it a hard push to the railway, only to learn that there was no train that night, but at another station, five miles further along, I might catch the last.

A Strenuous Journey.

The next five miles seemed interminable, and I had to struggle against the inclination to lie down at the roadside and sleep. The rain, accompanied by lightning, was incessant, and at the end of four hours I was so exhausted that the machine overbalanced and for some time I was unable to pick it up.

I was still staggering on in little stages when a motor car drew up (the only vehicle I saw in the whole distance) and the driver offered me assistance; being just returned from his works he suggested our going there and setting one of the night shift men to make what was required, but when I pointed out the impossibility of making a pulley, off-hand, as it were, he insisted on my abandoning the idea of pushing the remaining nine miles. Taking me to his house, near by, I was able to telephone home, and having fed me and dried my soaked clothing this good Samaritan lent me a pedal cycle and took charge of my old 'bus, assuring me of its safe arrival on the morrow by one of his own lorries.

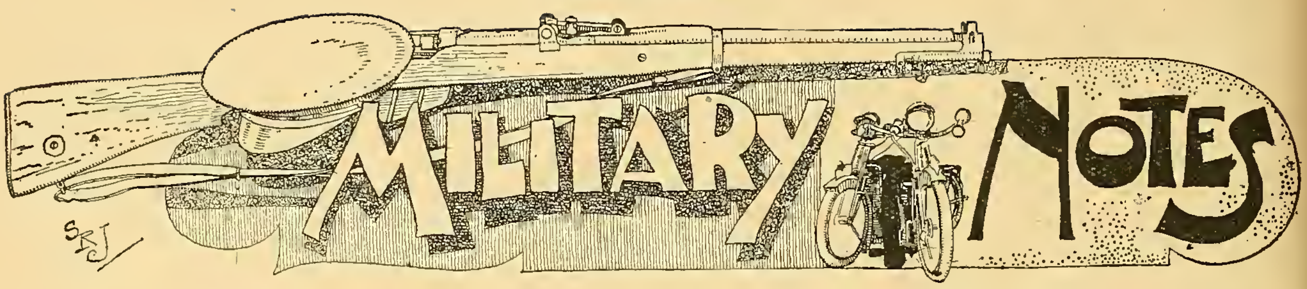
My first attempt with the pedal-cycle was a failure, for I was so tired that I promptly fell off, but I reached home in the early morning, having walked four miles, motored six, pushed the machine sixteen, and pedalled eight!

Thanks to the assistance of Mr. W——, the kind-souled munition maker, of O——, I was relieved of anxiety as to my machine, and I had still those two valued days of my leave to enjoy. Moreover, I had ample proof that the comradeship of those who use the King's Highway is not yet dead; after such an experience, who could doubt it?

WHARFEDALE.

THE DELIVERY OF MOTOR CYCLES BY ROAD.

THE other day a correspondent applied to the Petrol Controller's Department asking for a permit to deliver his motor bicycle by road to the purchaser, and received a letter saying that a permit under Clause 3 (F) of the Motor Spirit Restriction Order is not required if the vehicle is being used for professional, trade, or business purposes, *household affairs*, or for public duties. The words in italics are typed in purple, while the remainder is in black in the letter from the Petrol Department, so this infers that the delivery of a motor cycle by road to a man who has just bought it is allowed by the Order under the heading "Household affairs." But will all magistrates take this view?



Notes from Central Africa. Air Council. Old Time Motor Cycles.

PETROL SAVING IN THE SERVICES.

THE Petrol Executive has been impressing upon the Navy, Army, and Air Forces the necessity for further economy in the use of petrol. Leaflets and posters have been distributed saying, "Think seriously before using a motor vehicle or craft, or ordering it to be used."

* * *

THE AIR COUNCIL.

THE Air Council has been established by Order in Council as from January 3rd. It is constituted as follows: Lord Rothermere, Secretary of State and President of the Council; Maj.-Gen. Sir H. Trenchard, Chief of the Air Staff; Rear-Admiral Mark Kerr, Deputy-chief of the Air Staff; Commodore Godfrey Paine, Master General of Personnel; Maj.-Gen. W. S. Brancker, Comptroller General of Equipment; Sir William Weir, Director General of Aircraft Production in Ministry of Munitions; Sir John Hunter, Administrator of Work and Buildings; Maj. J. L. Baird, Parliamentary Under-Secretary of State; and Lt.-Gen. Sir David Henderson, Additional Member of Council and Vice-president.

* * *

AN OLD-TIME MOTOR CYCLIST.

COMPANY Quartermaster-Sgt. E. J. Bass has been recently mentioned in Despatches, and also awarded the Mons Star. Many of our readers will remember E. J. Bass as the enthusiastic hon. treasurer of the **Essex** Motor Club. He is still serving with the A.S.C., M.T., in France. In the early days he used to ride a 7 h.p. Peugeot as a solo mount, which was then one of the most powerful motor bicycles on the market. He writes from somewhere in France: "Just to wish all motor cyclists abroad, on the sea, in the air, and at home, as happy a Christmas as possible, and a prosperous and peaceful 1918. I hope this, my fourth year here, will be my last."

Quartermaster-Sgt. E. J. Bass.

MOTOR CYCLES AT THE FRONT.

WE have received the following communication from a corporal (R.E.), temporarily serving with the Belgian Army: "The motor cycles undoubtedly stand up to the work wonderfully. The Triumph predominates, owing to its strength, but *when shall we get larger tyres?* Sometimes we do get hold of 2½in. covers to fit 2¼in. rims, and what a difference where the comfort of the rider is concerned. With the 2⅜in. covers fitted, standard rims get smashed and dented beyond recognition, whilst the motor bicycles the Belgians ride (James, Rudge, B.S.A.) suffer very little, as their smallest tyres are 2½in. Please don't think this is a 'grouse,' but simply a small thing which would greatly improve matters, both for us D.R.'s and the machines."

* * *

FROM CENTRAL AFRICA.

WE have received from F. J. Astley, Captain and Chaplain, S.A. Motor Cyclists Corps, Nyasaland, the following letter describing the experience of motor cyclists in Central Africa:

"*The Motor Cycle* arrives regularly with every home mail, and continues to afford us constant edification.

"I notice in a recent number that Cpl. A. Hodgson, 4th L.A.M.B., has replied to the communication I sent *re* the taking of Godoma. There is no need for this subject to be the cause of further correspondence, but I will just comment on Cpl. Hodgson's two points.

First into Godoma.

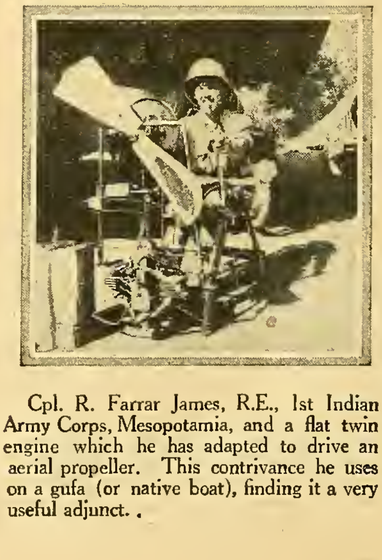
"First, that Cpl. Hodgson with another scout of the 4th L.A.M.B. was the first into Godoma—*i.e.*, before Lts. Hall and McHardie; these he met entering Godoma as he was returning to report to his O.C. I have laid this version before Lt. McHardie (Lt. Hall has been invalided home), who says he does not remember seeing anyone either returning from Godoma or already there when he arrived. However, for my part, I should be disposed to concede the point to Cpl. Hodgson, because it disproves Dvr. Miles Thomas's statement that the armoured cars were in before us. That could not be the case if Cpl. Hodgson's statement be true that he saw Lts. Hall and McHardie entering the town when he was returning to report. A remarkable echo of this episode has just transpired, and these two scouts will be interested to hear that they had a narrow escape. A German recently captured states that he was standing on Godoma Station platform with five or six others, and saw the cyclists pass over the railway crossing, which is only about a hundred yards from the station. As there were so many cyclists they did not wait, but decamped on mules through the native location. He did not see any cars.

Points re Machines.

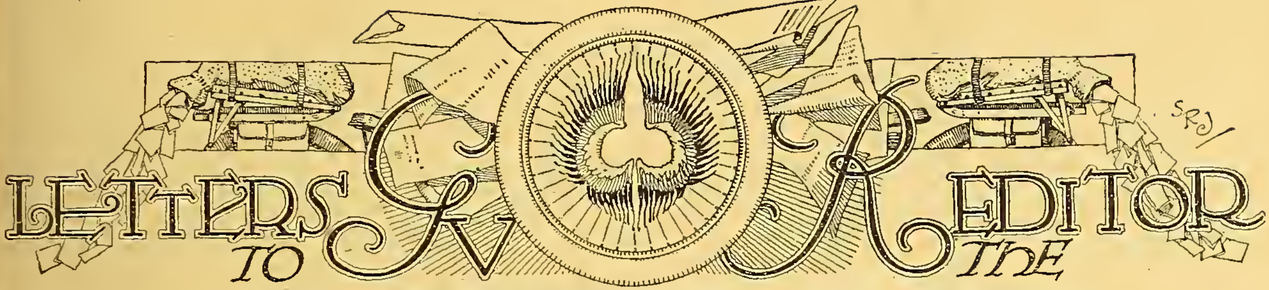
"The Douglas or any similar make is a fine little mount—if the difficulties in the roads are not stupendous, which they frequently were in this country, particularly after we passed 100 miles south of the railway. Until that time we had not experienced mountainous roads with surface of boulders for macadam. The L.A.M.B. riders travelled light, but every man of us carried kit and equipment weighing anything from 50 to 100 lb. For a long period two Lewis guns were carried on machines. Who would ask a light machine to do that day after day over roads which give them such a bucketing that, spare spokes form the mechanic's nightmare and rod iron is at a premium for reinforcing carriers?

"Again, the rainy season here is one long purgatory for the motor cyclist. Chiefly the surfaces were of white clay or black cotton soil, which latter is bottomless, like the nether pit, on the level and red clay on the mountains.

"We have just completed approximately 300 miles on our last run. There were forty-one miles stretch of sand. In its lightest parts it was a weariness to the flesh and a vexation of the spirit, but when it exceeded a foot in depth, even a B.S.A. with a low gear of 12 to 1 roasted up to furnace heat. In my opinion, however, it is the type more than the make which turns the scale."



Cpl. R. Farrar James, R.E., 1st Indian Army Corps, Mesopotamia, and a flat twin engine which he has adapted to drive an aerial propeller. This contrivance he uses on a gufa (or native boat), finding it a very useful adjunct.



LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address

DATE OF SECOND-HAND MACHINES.

Sir,—I should like to remark that I acquired a second-hand Humber motor cycle, wrote the makers *re* date, and received a courteous letter, giving date when the machine was despatched from their works.

Leeds. OSMONDTHORPE.

PISTON DESIGN IN TWO-STROKES.

Sir,—In reply to Mr. McDougall's criticism of the type of piston suggested by me in my recent article, I think he is under the impression which many motor cyclists have, that the pressure in the cylinder, even when both exhaust and inlet ports are uncovered, never falls below atmosphere. This, however, is not the case, for if the exhaust gases have a free passage out they cause a small amount of vacuum in the cylinder owing to their inertia. Thus, the piston can travel up on the compression stroke without encountering any resistance from the new charge of gas. At the same time, even if the cylinder were absolutely full of gas at the commencement of the compression stroke, a good fitting piston should be capable of holding any pressure which could be attained after it had passed over the ports in the cylinder walls. JAMES MARTIN.

FLYING IN A CURVED PATH.

Sir,—"Dyne," in his letter of January 3rd, is hardly happy in his suggestion of the earth as an example of a body travelling in a curved path under the influence of a single force. He has forgotten that the earth has an internal velocity of projection of the respectable order of eighteen and a half miles per second, which velocity (as there is no friction in the absence of a resisting medium in open space) would carry it on for ever in a straight line but for the sun's attraction, which causes the earth to curve towards the sun at the proper rate to travel round him in a closed curve.

The case is just the same as that of the projectile of a gun, if the resistance of the air be left out of account. The initial projectile force of the explosion would cause the shell or bullet to travel on for ever in a straight line but for the attractive pull of the earth, which deflects the missile downwards till it strikes the ground. To cause a shell to travel round the earth for ever, nothing is needed but some extra velocity if the atmospheric resistance were removed. A muzzle velocity of 26,000 feet per second would do it.

I suppose "Dyne" would hardly contend that a shell during its flight is acted on by one force only. And I question "Dyne's" assertion that a bicycle or motor cycle does not require extra power when making a turn. I think if he will try making a sufficiently sharp curve on a push bicycle he will find himself forced to pedal harder in order to avoid a spill. The change from a straight line to a curve requires extra power. Once the curve is established the extra power must be kept up to maintain it. "G.E.H." was quite right. The mere fact of a body following a curved path proves that at least two forces must be acting on it.

WM. F. A. ELLISON.

Sir,—I was very pleased to see "G.E.H.'s" letter in your issue of December 27th, 1917. I am glad to see that someone else has taken up the gauntlet I threw down, but am sorry Mr. W. G. Aston himself has not seen fit to reply to the criticisms he has received on the subject.

May I crave a little space to answer "G.E.H."?

He refers to very early machines, *i.e.*, the aero "tripehound" and the Blackburne. I do not think Mr. Aston thought of any time but the present in writing his articles. In any case, arguing on these lines we might just as well assume that because a 3½ h.p. motor cycle would not climb Alms Hill in 1904 it would not climb it now. Which, as Euclid is reputed to have said, is absurd.

So much for the past. "G.E.H." then proceeds to mention an occasion when a machine of official design lost 1,000 feet on a turn. "Why?" he queries. Naturally, one cannot say definitely. I may suggest a "dud" engine, poor rigging, or inferior piloting. But the most likely reason of all is probably that the machine was of official design!

Let "G.E.H." ask some of his friends in the R.F.C. their opinion of *officially* designed two-seaters.

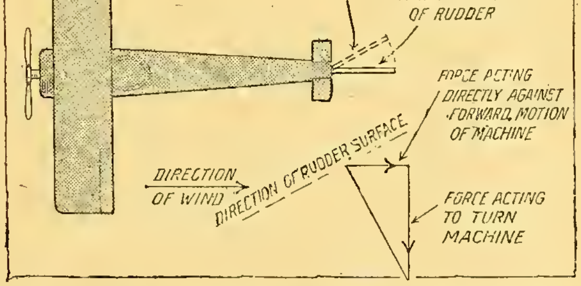
When embryo "birdmen" are learning to fly they are taught how to turn by keeping the machine turning for minutes at a stretch. Well do I remember careering round and round and round like any horse on a merry-go-round at a fair. Yet at the finish of air evolutions we were always higher than at the beginning. I particularly remember this because my instructor always used to ask our height when we had finished, and these were "pukka" steep turns, too.

Sometimes theory and practice *do* differ. I cannot profess to be much of a theorist, but modestly claim a fair amount of practical experience.

Many thanks to "G.E.H." for replying to my letter, and also to you, sir, for allowing me to waste so much of your valuable time. May I conclude in the hope that Mr. W. G. Aston will unbend and fell me with a shrewd blow? Like Mr. Asquith, I will w . . . F.M.C.H., LT. R.F.C.

Sir,—In your issue of December 27th, 1917, your correspondent "G.E.H.," Leeds, makes some interesting remarks with regard to aeroplanes, especially as concerns a machine's losing altitude when turning, and asks "Why?"

As we already know, the machine remains in the air only by reason of power being expended, and it is clear that, when the power available is decreased, the machine will fall.


"POSITION" OF RUDDER WHEN TURNING.
NORMAL POSITION OF RUDDER
FORCE ACTING DIRECTLY AGAINST FORWARD MOTION OF MACHINE
DIRECTION OF WIND
DIRECTION OF RUDDER SURFACE
FORCE ACTING TO TURN MACHINE

In the diagram, consider the rudder of an aeroplane. When the machine and rudder are in a straight line, as shown by the full lines, no resistance to forward motion is given by the rudder. In order to turn the machine, a sideways force is necessary, but, as shown, this is only obtained by introducing a retarding force also. The resistance of the machine is increased, with a consequent demand for more power. As the power available is assumed constant, the machine must gain the necessary extra power by gravity, and this, of course, necessitates a decrease in altitude.

Norwich. A.A.S.

MOTOR TRADERS AND THE NEW RESTRICTIONS.

Sir,—We feel sure that motor traders are themselves to blame for the drastic nature of the many restrictions which have been put on motoring, in so far as they have allowed each new restriction to be launched without any effective protest or opposition. No doubt there have been occasional protests from local or district organisations, but much more is wanted to meet with any possible success.

We trust that the lead we have taken in this matter may induce other traders to formulate ideas and suggest them publicly. If the traders of each district get together, resolve on a course of action, and appoint delegates, who would act in the traders' interests, for one grand central meeting, that would be a rough outline of the programme to be followed. The Government have already announced that restrictions will be placed on the use of coal gas; and if traders are to do anything at all, no time should now be lost in considering what we are to do.

ALEXANDER AND CO.

GOODS MADE IN GERMANY!

Sir,—It seems Mr. Chas. S. Ives has more supporters than you expected.

Allow me to express my opinion, and perhaps "Ole Bill" will not need to question my nationality if I say that I am a discharged soldier, and one of the lads who joined in September, 1914.

This war has been a lesson to the world, and every day brings some awful news of suffering. I can see no good coming from an after-war boycott; it will only breed hatred, and hatred is the seed of war. Besides, what is the use of killing German Prussianism if we set up the same kind of thing at home?

I think it would be far better if you used your spare paper—that is, if you must use it for such things—to create a more brotherly spirit after the war, and thereby live down the cause of it.

I did not join, and I feel sure very few joined, to help our profiteers to continue profiteering after the war, as would be the case if we allowed them to monopolise the market.

I have suffered through this war, but I shall buy and use the article that suits me best, be it German or any other make.

Your paper is far too interesting for me to "give it the sky."

TOM E. TANNER.

Sir,—Allow me to thank you for the lead you have given to the British press in reference to the above—a lead which, I trust, will be very far-reaching. In the December issue of *Impressions*, the editor of that paper asks his readers for their opinions on this very subject. Accordingly I have written giving him mine, and quoting from your correspondence pages. It seems a sign of the times that the best letter supporting your admirable attitude should come from a lady, "E.J.H.," in your issue of 27th December. The tone of the letter from Chas. S. Ives and those of his supporters is very remarkable, several of them suggesting to the proprietors of *The Motor Cycle* that their policy, if persisted in, will mean the paper's ruin. For the benefit of those readers who have not followed this correspondence closely, may I give some extracts from your issue of 3rd January?

"F. Jones," in support of "Ives," states: " . . . Now I am a strong believer in always giving honour to whom honour is due, whatever the make of an article is; and I call the Paris Resolution nothing but one to keep hatred up, and I think a paper like yours which is for sport . . " and finishes by threatening the proprietors that he and a good few others will stop taking *The Motor Cycle*. . . . This is followed by your Editorial Note: "Naturally we do not agree with the views expressed above, but as we wish to give all sides a fair hearing, we publish our correspondent's letter exactly as received."

"R.O.W." thinks "That gratitude for the Bosch magneto in the past should wipe away all bitterness regarding the horribleness of the Hun in this war."

Whilst "Leslie S. Broad" and "Ole Bill" write in the same issue expressing disgust at the sentiments set forth by Chas. S. Ives, Maurice Little, and others.

That men like Ives, Jones, etc., should use the word "sporting" in such letters as theirs is irony indeed. To you, sir, I take off my hat for the sporting attitude you adopt in adding such a courteous footnote to F. Jones's letter. Just think of it! A letter to an English paper, in which the writer (signing himself "Jones") swells his little chest and congratulates himself on "giving honour to whom honour is due." This in reference to Germans, be it noted! Apparently he has absolutely none for one of the first papers which boldly states that it will in future decline to handle money from a people whose actions are too horrible to put in plain type—poisoners of wells; murderers of old men and women, Red Cross nurses, and babies; who have crucified little children; cold-blooded murderers of British sea captains who attempted to defend their ships against the attack of submarines; whose women did not shrink to add to the tortures of British wounded; whose submarine commanders lurk unseen to strike (and who have struck) hospital ships crowded with helpless, suffering men, also passenger ships crowded with women and children, when hundreds of miles from land.

Surely all right-thinking men and women will agree with your attitude, and refuse to have dealings with such a people for at least a generation, or until it is proved beyond question that they are capable of honouring their promised word and of playing the game amongst the civilised and uncivilised peoples of the world.

I hope, sir, you will permit me to direct your readers' attention (especially Mr. Ives's and his supporters) to the strong, sane, and uplifting leading article in *The Times Literary Supplement* of 3rd January, entitled "The Hope of the New Year," from which these words are taken: " . . . they cannot believe lies for ever. They may believe them as long as the lies seem to benefit them, but when they profit them no longer they will not wish to believe them. . . . And what is most desirable of all is that the Germans shall recover their humanity; that the laws of the human mind shall work in their minds. 'God is not mocked.' That saying expresses the universal hope; but God will prove that He is not mocked by no revenge of ours—for revenge is His—but by the effect of their misdeeds upon the Germans themselves."

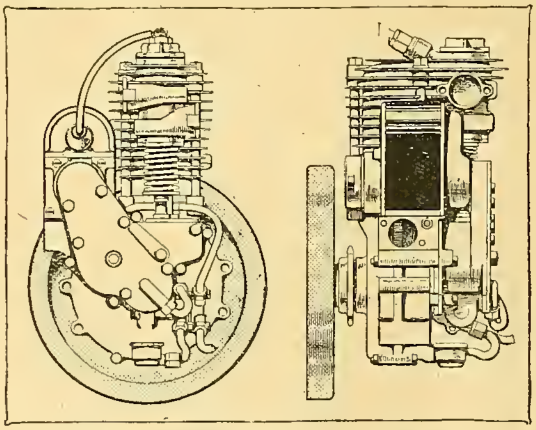
H. HORNER MAYNE.

THE IDEAL SINGLE-CYLINDER MOTOR CYCLE.

Sir,—I have before me an article by Capt. A. Lindsay—"The Future of the Single-cylinder Mount," in your issue of December 17th, 1916.

My ideal solo mount has 52in. wheelbase and a single-cylinder motor with a gear box chain transmission and shock absorber, plenty of power, minimum weight and c.c., high r.p.m., high compression and volumetric efficiency, automatic oiling, and carburetter, efficient cooling, low centre of gravity, and good balance.

I am now making a small number of a motor 70 × 90 mm., braking 7 h.p. at 3,000 r.p.m., with a magnesium alloy piston weighing 0.22 lb., and a very short connecting rod (1.5 times the stroke) to get a good volumetric efficiency at high engine speeds. The reciprocating parts are completely balanced, and also the revolving parts, through a very simple and reliable design. I am also testing a new valve design, and take air through the crank case.



An engine design submitted by a Swedish reader.

Stockholm, Sweden. HUGO MOREN.

DISTRIBUTION OF FOOD SUPPLIES.

Sir,—If only attention be promptly focussed upon our food and transport problems much may be done to minimise the evil effects of queue scandals. It is not of the smallest use to tinker with one aspect and leave the rest untouched.

The question of food supply naturally hinges upon those of food control and food transport. Your readers may be shocked to know that, while millions of our citizens spent Christmas in comfort, there were certain cases in rural districts in which families found themselves with no paraffin, no sugar, no tea, no margarine, and no meat except such as the unhappy labourer had in desperation picked up in a poaching expedition. Instead of finding remedies, the Food Controller seems to be adding difficulties. The farmer is bound hand and foot, so helplessly "controlled" that he can buy little, and sell nothing except under conditions that hamper, harass, and irritate him. Here, food abounds; there, people suffer for the want of it. Yet there are in the kingdom tens of thousands of idle petrol-less pleasure cars and thousands of others out of commission for want of new parts. The first should easily be available. Of the second, speaking from experience as scientific welders, at least 95% of the fractured parts could be restored to use by the welder within a few days.

There remains the question of propulsive power. This may not be so amenable to treatment immediately, but it can be dealt with. We have too long allowed the latent wealth of the Empire to lie undeveloped. Perhaps it will scarcely be believed that in one small area Overseas there are "in sight" a hundred million tons of oil-producing material, absolutely untouched, easily transportable by gravitation direct to tankers. We do not think it is creditable to us as a nation that parts of the Empire so rich in mineral wealth should so long be neglected.

BARIMAR, LTD.

SPONTANEOUS IGNITION.

Sir,—Judging from "C.R.E.'s" letter, it seems that he is not at all clear on the subject of the temperature of spontaneous ignition, due no doubt to the scantiness of detail available.

To quote Mr. Moore's paper in the *Journal of Society of Chemical Industry* of February 15th, 1917: "The temperature of spontaneous ignition is the temperature at which a substance, surrounded by oxygen or air at the same temperature, will burst into flame without the application of any spark or other local high temperature."

Mr. Moore's apparatus consists of a closed platinum crucible through which is passed a stream of air or oxygen. The crucible is situated in a heated block of metal, the temperature of which is measured electro-pyrometrically. The liquid fuel to be tested is allowed to fall, a drop at a time, into the heated crucible. When the t.s.i. is reached a slight explosion takes place, and the temperature indicated by the pyrometer is noted.

"C.R.E.," therefore, will observe: (1.) That the question has nothing to do with a gaseous explosive mixture. (2.) That oxygen or air, as the case may be, alone was present. (3.) The determination was carried out at atmospheric pressure, and that the question of pressure does not enter in, it being merely one of temperature.

The figures "C.R.E." quotes are rather meaningless without their attached explanation. Taking them as he gives them I should read them to mean that if a petrol air mixture is at a temperature of 364° F. and a pressure of 90 lb. per square inch, then the temperature of 986° F. must be reached before it will explode.

The second part of his deduction, however, tallies roughly with the figures of Mr. Moore. If air is compressed to 90 lb., as in a Diesel, the temperature rises 207° C. The t.s.i. of petrol is 370° C., therefore the original temperature must not be above 370 — 207 = 163° C. = 325° F.

The essential point about composite fuels, as shown in "Chemistry of the Internal Combustion Engine," is that they consist of a heavy portion, such as paraffin, and a more volatile part, such as ether, so that easy starting from cold may be assured. There are no figures available, but it is a safe assumption that the t.s.i. of a mixture will be the same as the constituent having the lowest value.

In the article just referred to reference was made to the subject of "cracking," and it was pointed out that fuels of the benzole, toluol type were more liable to this form of decomposition. "Cracking," however, only takes place at high temperatures, above red heat, which, in an engine, is only likely to occur in the gaseous portion during the actual explosion. If sufficient air be present a considerable portion of the carbon liberated through "cracking" will be combusted. The question of pre-ignition due to the formation of substances of lower t.s.i. may be ruled out, I think, as these bodies would be only momentarily formed in the course of explosion and immediately combusted. Experience does not show that bodies of the benzole class tend to pre-ignition.

Rochester. S. E. FOX.

Sir,—As a reader of your esteemed journal, I have noted the paper and correspondence which have recently appeared on the subject of spontaneous ignition. The variation in ignition temperatures determined by different investigators is extremely large, and I might point out that several other workers besides Holm and myself have obtained sets of figures still more widely divergent. I am at present engaged in investigating the reasons for these discrepancies, but am not yet in a position to make any definite statement.

Mr. Fox suggests that the ignition temperature of a fuel in the gaseous state is greater than that of the fuel in the liquid form. This theory naturally suggests itself from the figures by Holm and myself, but I am inclined to think that it is an incorrect conclusion. The ignition point of compounds is influenced by the complexity of the molecule, more complex molecules having lower ignition points. Most gases, being comparatively simple compounds, possess high ignition points. The actual conditions under which the experiments are conducted cause enormous variations in the results, which can only be accepted as comparatively correct. And although I have made many observations and read other people's publications with great care, I consider that it is the variation in conditions which affects the results, and not any difference between the ignition points of substances in the liquid and in the gaseous state.

I might point out that hot air intakes raise the maximum temperature of the charge with any given compression pressure, thus tending to promote pre-ignition. Also, hot air intakes lessen the weight of air drawn into the engine during the cycle, thereby decreasing the power of the impulse at maximum load.

With reference to the letter by "C.R.E." in your issue of the 3rd inst., I wish to point out that the ignition point can only be looked on as a relative value, and that the question regarding the effect of engine conditions—which are very complex—was treated in my paper in *The Engineer* of the 22nd June, 1917. The effect of certain mixtures was also noted.

It is difficult to say whether "cracking" takes place in petrol engines, but I should be inclined to think that this phenomenon does not occur to any considerable extent, as the common motor fuels do not readily undergo "cracking," and the carbon on piston tops generally originates from lubricating oil, or sometimes from the precipitation of carbon from the fuel, which is caused by the use of mixtures containing insufficient air for complete combustion, *i.e.*, too rich a mixture. HAROLD MOORE, M.Sc. Tech., F.C.S.

AVERAGE SPEED.

Sir,—Far be it from me to question the accuracy of any member of the B.E.F., but I cannot help thinking that when "Eldon" rode from Cheltenham to Tewkesbury in ten minutes (he said ten not eleven minutes in his first letter) the clock at Cheltenham must have been fast and that at Tewkesbury slow. I know this road well, and though most of it is straight, there are several cross-roads, and one very dangerous corner where an A.A. scout was always posted in pre-war days. Not only that, there is nearly a mile of traffic riding in Cheltenham, and I can only say that anyone who did the journey at fifty-four miles per hour, unless in the early morning, would deserve imprisonment as a criminal lunatic.

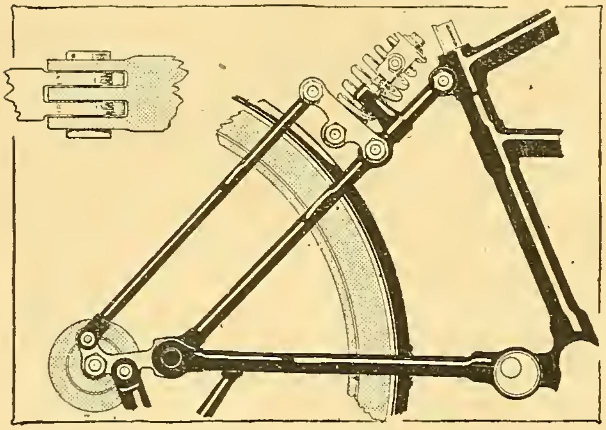
The maximum speed of which a machine is capable has little to do with the average speed if the rider observes the decencies of the road. Except on an absolutely straight road, where the rider can see at least half a mile ahead and see over the hedges and walls of all cross-roads, no one has any right to travel at more than forty miles per hour; and if he slows down to twenty miles for all blind corners, cross-roads, villages, and restive horses, not to mention stops for cattle and sheep, he cannot average more than 27 to 28 m.p.h. H.C.W.

MORE REAR SPRINGING.

Another Device that may be fitted to most Existing Machines.

MANY of the springing arrangements for motor cycles that have recently passed through the hands of the patent agents are supported by the names of well-known and respected firms, and there is no doubt that many riders will be anxious to try full springing on their favourite mount when the opportunity occurs. In our opinion, there is also a considerable future awaiting the patentee of the first really efficient device that is capable of being fitted to any machine.

The arrangement illustrated has this recommendation, but to avoid disappointment and unnecessary enquiries we will say at once that the conversion is not a few minutes' job. It is, of course, very improbable that any arrangement allowing of very simple conversion will meet with full success, because such a device will of necessity be of somewhat flimsy construction.



A rear springing arrangement that may be fitted to existing machines.

Mr. J. Warner, of Coventry, claims for his patent that it may be fitted to most standard machines, and that the conversion is likely to give satisfaction in service. Whatever may be said for or against the fitting, it is certainly of substantial design.

The Construction of the Device.

The most outstanding feature of the frame is, perhaps, the presence of a double back stay and the large spring underneath the saddle. The ordinary rear frame connections are retained, and the seat-pillar stays and other saddle stays are consequently in no way lessened in their rigidity. The rear fork ends, *i.e.*, the points of junction of saddle stays and chain stays, are converted, or rather replaced, by two hinged members, in which swivel a pair of links that are continued normally in a straight line and carry the wheel spindle in the ordinary way. It will be clear that as a result of this construction the wheel spindle is free to pivot and swing round the ends of the stay, the control of this movement being where the springing is brought into play.

Pivoted to each link, and bridging the wheel, is a yoke which is connected to a second link system placed immediately beneath the saddle, and also containing the controlling spring. This upper link system consists of two plates or bars, which are attached to the yoke (through a sleeve) by means of a bolt, and are similarly attached to the two saddle tubes, into which are inserted ball bearings, so that in this case the bolt will be free partially to rotate against the action of the spring on these ball bearings. The controlling action of the spring is exercised very simply as follows. Besides their two main connections the two links are also connected by a bolt, forming a bridge, placed midway between the yoke and saddle tubes. On to this bridge is fixed the spring in a more or less vertical position. The top of the springs rests in a U piece, which, of course, is pointing downwards. The two ends of this U piece are threaded, and are held in lugs brazed to the two rigid saddle tubes.

The Action of the Arrangement.

When the back wheel receives a shock, due to a road inequality, it swings round the two lower pivots and transmits the shock, *via* the yoke arms, to the upper side plates or bars. From these bars the shock, through the bridge already referred to, passes into the spring, where it is absorbed in the ordinary way.

One important advantage of this system is the ease with which the tension of the spring may be adjusted to suit the weight of any rider. As has been mentioned, the ends of the two U pieces are threaded, and the tension on the spring may be adjusted by means of lock nuts on these threads. Naturally, the greater the compression on the spring the less give is there to any road shock, and consequently the amount of tension necessary varies directly as the weight of the rider.

The inventor also claims that the fitting of a sidecar is in no way impaired by this system, and also that the device will work equally well whether the machine has a sidecar attached or not. The carrier is, of course, also sprung, so that a "pillion" passenger would also receive the benefit of the springing.

3D.

THE PRICE of THE MOTOR CYCLE

TO BE RAISED TO 3D. ON FEB. 7th.

This further increase is necessary owing to the drastic restriction imposed on the import of paper and paper making materials during 1918 and the consequent heavy advance in the cost of paper, but the price will be reduced as soon as circumstances permit.

The subscription rates will be correspondingly raised on renewal or to new subscribers:

British Isles .. .. 15/2 per annum, post free.
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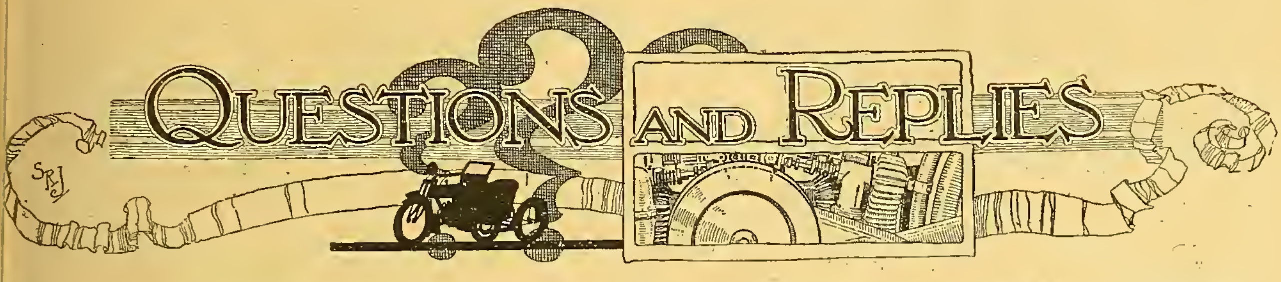
All subscriptions current at the time of reducing the price will be proportionately lengthened for the benefit of each subscriber.

QUESTIONS AND REPLIES



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Difficult Starting.

I have a 2½ h.p. two-stroke motor cycle, whose only fault is that it refuses to start without two or three injections; but on receiving an injection it will fire for about ten yards, and then stop. After repeating this two or three times, it will run perfectly. I have recently fitted new platinum points, and the timing has been checked and found correct according to *The Motor Cycle* handbook. It is fitted with a 1915 Senspray carburetter, and I have tried all positions of levers with no success.—R.S.

The difficulty in starting is undoubtedly ue to the cold weather and to the eavy petrol we are having at the resent time. Also the carburetter may e feeding too weak a mixture when ou attempt to start, and a slightly arger jet might be fitted and used during he winter months. We presume you ood the carburetter before attempting o start.

For Business Purposes.

Up to the present I have used my sidecar outfit for business and pleasure, and have always taken out the local taxation licence. Being now only allowed to use the machine for business and shopping (I live four miles from a town, four and a half from a railway station, and two miles from the nearest shop), is it absolutely essential to take out the licence if I am prepared to paint my name, address, and business on the sidecar? Nearly always on shopping excursions I have business to attend to—piano tuning—and so combine the two, thus being practically always on business. If painting name, etc., on sidecar will exempt me from taxation, will it be sufficient to disfigure one side only?—H.V.

You will not be exempt from the local taxation licence unless your machine is constructed and used solely for the transport of goods and merchandise—that is to say, unless it is fitted with a delivery box in place of a sidecar seat, and this is never on any occasion whatsoever throughout the year removed. Then we hold that you would be entitled to exemption from the tax, and would be also entitled to apply for a free-of-duty petrol permit. Painting the name on the sidecar body would not suffice.

20 m.p.h. Speed Limit for a 6 h.p. Twin.

I have a 1914 6 h.p. twin-cylinder motor cycle and sidecar. Lately it has taken to stopping gradually after attaining speeds of over twenty miles per hour. Also whenever it comes to a hill it loses power altogether, and I have to put it into low gear at once. I have cleaned out the cylinders and ground in the valves, and looked at the usual induction pipe joints, etc., but can find no cause for this stoppage. It is not "drying up," as the oil is the same as it always has had, and it goes through all right both with the automatic feed and by the hand pump. I have been a motor cyclist for eight years, and believe I know the usual causes of troubles on motors, but cannot detect this, and shall be very glad if you can advise me. The trouble is not overheating, as it will do it in the first mile from cold.—H.N.

Present-day petrol is apt to make up the jet in such a way that the partial stoppage is hardly noticeable when examining the jet, and by passing a needle through it the accumulation of foreign matter can be removed. You might try the effect of new plugs, but we rather think your trouble is due to the engine periodically starving for petrol. Make sure that the air vent in the tank stopper is not filled up, that your petrol level is correct, and that no air lock is occurring to hamper the flow.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week.

The Treatment of Accumulators.

My James combination is fitted with a Lucas dynamo lighting set. Under the new restrictions I have not had it running for over a month, and it may be another month before I have to use it again. But it must be ready at any time to take duty in the country. What is the best thing to do with the accumulators? As I cannot run the machine I cannot charge them, yet if I have to go out in the country I shall certainly want the electric light. Your advice will be much appreciated.—E.F.W.

You will have to have your accumulators recharged at a garage, say, every five weeks. It would be a good plan to switch one lamp on for a few minutes every week.

Throttle will not shut.

I should esteem it a favour if you would tell me (1) the correct way to adjust my Amac carburetter. When I start up the engine in free, I cannot stop by the throttle, but only by lifting the exhaust. (2.) I find the exhaust valve is badly worn about half way up the stem; is this the cause of a spitting noise in the silencer? (3.) Would you advise me to put in a new one, as I have two spare valves; and if I fit another, is there much trouble in adjusting it? Also the valve stem is a rather bad fit in the guide (in cylinder).—W.H.

(1.) Remove the gauze over the air intake of your carburetter, open the air lever fully, and then attempt to close the throttle. You will probably find that the throttle is hitching up near the bottom of its movement. If this be the case, it means either that the wire is too short or that it requires adjustment by means of the adjusting screw immediately above the carburetter. (2.) Quite possibly. A new valve should be fitted. (3.) On fitting it, grind it in lightly with oil, run the engine until it is warm, and see if the clearance at the tappet is correct. Probably the new valve will be a better fit in the guide. If the guide is really badly worn you should attempt to get another one, but spares are at the present time rather difficult to obtain. There is no difficulty in fitting a new valve; all that you have to make sure of is that the tappet adjustment is correct—about the thickness of the cover of *The Motor Cycle* between the valve and the tappet.

Sparking at Contact Breaker.

Will you kindly tell me whether there should be any sparking at the platinum points, and, if not, how I am to prevent it? I gather from my handbooks that it is the function of the condenser in a magneto to prevent destructive sparking across the points. Am I correct in my inference that the slightest spark is destructive? My machine is a 2¼ h.p. two-stroke of reliable make, and takes me merrily on my business with never a hitch, but my accidental discovery of the above-mentioned sparking has caused me a little worry.—D.J.B.L.

There should be practically no sparking at the platinum points. You are quite right, the condenser is intended to prevent a spark in the low tension circuit. Naturally the more sparking you get the more rapidly are the platinum points consumed. Excessive sparking is nearly always due to a defective connection in the condenser system. If the sparking is only slight and the machine runs well there is no reason for you to worry.

Unsatisfactory Running.

I have a 2½ h.p. two-stroke machine that has a curious and annoying habit which I am at a loss to explain. It starts easily enough on low gear and "revs." well, but as soon as the high gear has been engaged it refuses to fire on the throttle being reopened after the change. I have sometimes thought that it was worse when the engine was warmed up than when cold. At any rate, whether hot or cold, it will start on top gear without this misfiring. It seems a mystery to me, especially as I am always careful to get up a good speed before changing into high gear. The engine never overheats. I have suspected the magneto. The platinum points became very pitted and worn after the machine had done about 1,400 miles. I had to file them. About 600 miles further on they needed smoothing over again. Is it correct for a spark to occur at the points each time they break? This always happens. Also, will you please tell me why the points should separate .4 mm.? What difference would it make if they separated, say half-an-inch? I do not understand that, and have never seen an explanation of the limitation.—C.H.L.R.

We should say that the trouble is more likely to be due to carburetter adjustment. Try varying the size of your jet, and try a size larger and a size smaller than you have in already. What might happen is that the engine either chokes through too strong a mixture or the mixture is too weak—that is to say, when the engine slows down owing to a change of gear the mixture is not strong enough to enable it to fire. With regard to the magneto giving excessive sparking at the platinum points, this is almost invariably due to a faulty condenser connection. While it is impossible to eliminate sparking at the platinum points altogether, this should be reduced to a minimum. The reason why the platinum points should separate approximately .4 mm. is that this is a convenient space to give the requisite time of opening and closing and also to fit conveniently in a normal contact breaker. Thus, the magneto being timed and made to work at that gap, it is best to observe it.

Defective Alignment.

Will you kindly answer this query? If a sidecar combination drags towards the left hand, should the front of the sidecar be moved nearer to the motor cycle or farther away from it? This, of course, is referring to a sidecar fitted to the left side of the motor cycle.—K.C.O.

We should say that the sidecar and motor cycle were not in alignment with each other; in this case the front of the motor cycle should be moved rather closer towards the sidecar. Theoretically, the two should be quite parallel, both horizontally and vertically, and there is always a slight tendency to pull to the left on the part of a sidecar combination. This, however, should not be so great that it cannot be corrected with the least possible effort on the part of the driver. Possibly the weight of the sidecar passenger is too far forward, *i.e.*, not sufficiently over the axle.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

Explosion Queries.

(1.) How much power or speed is wasted by the compression stroke of a 3½ h.p. motor cycle? (2.) What volume of gas is drawn into the cylinder at each induction stroke, and what size of force pump (bore and stroke) would be required to deliver the same amount of gas, the pump working at engine speed? (3.) What is the greatest force of the explosion?—W.J.G.

(1.) The amount of speed wasted by the effort required for compression depends entirely on the initial speed of the machine. In most cases it is probably practically *nil*. If no explosion takes place, theoretically, there is no waste of power in turning the machine over compression, because the power required to accomplish this is automatically returned by the expansion of the gas after the piston has passed top dead centre. If an explosion is taking place, compression cannot be said to absorb any power, as the absence of compression would materially reduce the power of the explosion. (2.) The volume of gas drawn into the cylinder on an induction stroke depends entirely on the volumetric efficiency of the engine. As a rule, this is about 85%, so that in an engine of 500 c.c. the amount drawn into the cylinder would be 425 c.c. The necessary pump dimensions naturally depend upon the effective strokes of the pump. (3.) As a rule, the maximum explosion pressure is about 300 lb. per square inch on the head of the piston, the total force thus being 300 multiplied by the area of the piston in square inches.

A Legal Question.

I left my motor cycle and sidecar at a garage, saying I would call for it in a few hours. In the sidecar were two coats and a parcel, so I mentioned the articles to the boy in charge at the time, asking him if they would be safe during my absence. The boy said they would be quite all right, so I left the articles and went off. When I called back that night my wife's coat was missing—a black fur coat valued £3 10s. Another man was in charge then, and could not give me any information. The man would not take the garage fee I offered, so I called the next morning to see the manager. He said he was sorry to hear of my loss, but could not hold himself responsible for it. He admitted it was the boy's fault for not taking the things into the office and giving me a receipt for them. The boy happened to have a day off that day, and the manager could not say anything until he had seen the boy about it. I had to be back in camp on the Tuesday, so I could not call again when the boy was there. I left my address, then informed the police, but up to the present have not heard anything. Can I claim the value of the coat? I paid the manager 6d. garage fee, but did not get a receipt.—H.F.

In reply to your query, our legal adviser replies as follows: "As the garage proprietor's servant accepted the coats he assumed, on behalf of his principal, responsibility for them, and was bound to take reasonable care of them. Unless, therefore, the proprietor can show that he took proper precaution to prevent the coats from being stolen, he would have to pay damages to your correspondent."

RECOMMENDED ROUTES.

CHELTENHAM TO NEWMARKET.—E.M.M.
Cheltenham, Andoversford, Stow-on-the-Wold, Chipping Norton, Deddington, Aynho, Buckingham, Stony Stratford, Newport Pagnell, Bedford, Biggleswade, Cambridge, Newmarket. Approximately 130 miles.

BATH TO RUTHIN.—J.H.D.
Bath, Nailsworth, Stroud, Gloucester, Tewkesbury, Worcester, Kidderminster, Bridgnorth, Much Wenlock, Shrewsbury, Ellesmere, Wrexham, Coedpoeth, Ruthin.

LUTON TO LITTLEHAMPTON.—P.B.
Luton, St. Albans, Watford, Rickmansworth, Uxbridge, Staines, Chertsey, Weybridge, Cobham, Leatherhead, Dorking, Billingshurst, Pulborough, Bury, Arundel, Littlehampton.

WINDERMERE TO BIRMINGHAM.—A.H.
Windermere, Kendal, Lancaster, Garstang, Preston, Wigan, Warrington, Tarporley, Nantwich, Woore, Pipe Gate, Stone, Weston, Rugeley, Lichfield, Sutton Coldfield, Birmingham. 160 miles.

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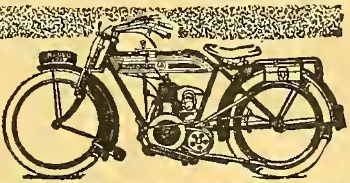

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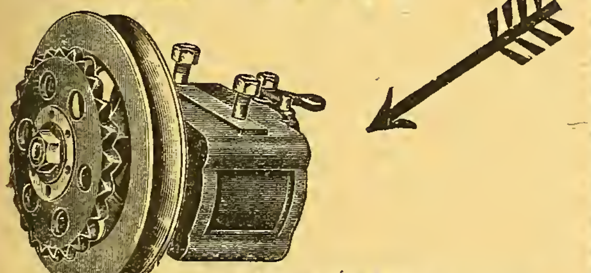

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MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns—First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

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A.J.S. Spares; prompt delivery.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

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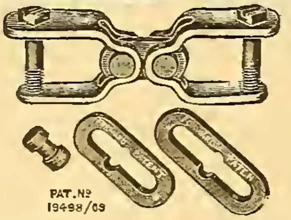
A.J.S., 1914, 2-speed, clutch, and K.S., all-chain drive, £37/15; 1913 model, £35; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X0735

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—A.J.S., 1916 6h.p. De Luxe combination, hood, screen, spare wheel; 97 gns. (D) [2644

A.J.S. Motor Cycles.—Immediate delivery of the very latest 6h.p. models from stock.—The A.J.S. Specialists, The Walsall Garage, Walsall. Tel.: 444. [X9872

A.J.S., 2¾h.p., 1916, sporting model, 3 speeds, speedometer, Lucas lamps and horn, in excellent condition; £50.—Whitaker, Carlton Lane, Guiseley, Leeds. [X0651

A.J.S. Motor Cycles.—Immediate delivery of special 1917 model, complete, detachable wheels, 700×80 tyres; £91/6; trade supplied; no permits required.—P. J. Evans, Sole Agent for Birmingham and district. [X0652



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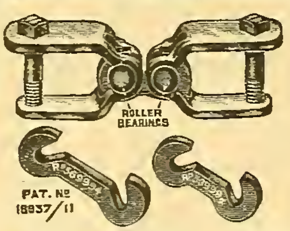

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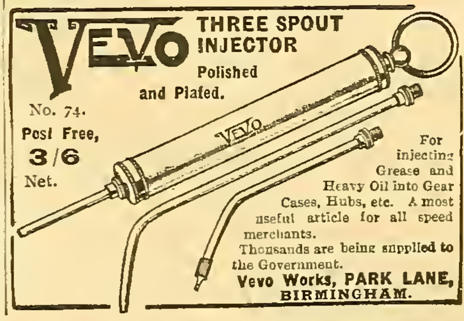

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2¾h.p. A.J.S., new July, 1916, had very little wea now hung up with broken chain, otherwise t top condition; I cannot get a chain, or would not sel price £45.—Horace Freeman, Highfield House, Sandw St., Walsall. [X06

1916 4h.p. A.J.S., makers' No. 8,060, with A.J. coach sidecar, wind screen, luggage grid, lock toolbox, storm apron, spare wheel and new tyre, 2 Lu lamp sets, Lucas horn, Watford trip speedometer, ma spares, mechanically perfect, hardly used, brand n appearance.—Robinson's Garage, Green St., Cambridg [27

6h.p. A.J.S., very latest model, Service finish, 28 wheels, new from works October last, not do 1,000 miles, and just run in, Mills-Fulford Corve sidecar, hood, Ward and Goldstone accumulator lig ing set, Bonniksen £5/10 speedometer, outfit cost o £122; complete and perfect in every respect; £105 Batten, Fieldgate Close, Kenilworth. [X0

Alder.

ALDER, 1915, 2¾h.p., 2-stroke, fine condition, speeds, £20; also Mills-Fulford sidecar body on little used, H.D. grey, £4.—Warner, Leehurst, Cr thorne. [X06

Alldays.

ALLON, 2-speed, £29/10; also all new models; E or exchange.—Service Co., 292, High Holbo W.C.1. [X07

ALLDAYS Matchless, late 1914, 2½h.p., 2-stro in splendid condition, recently overhauled; secures; seen by appointment.—Iggulden, 46, Vale Tonbridge, Kent. [27

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-sp countershaft models in stock. [1

ARIEL, 3½h.p., 2-speed, free engine, Bosch ma £13.—Foreman, Tynygroes Bridge, Ganllwyd, gelley. [X0

ARIEL, 5-6h.p., 3-speed and clutch, C.B. sidecar, b screen, Lucas lamps, Cowey speedometer; £ E.P. or exchange; all new models supplied.—Service 292, High Holborn, W.C.1. [X0

Auto-Wheels.

1914 Auto-Wheel B.S.A. de Luxe, tyre and mach perfect condition, shock absorbers; £9.—To end, Mobberley, Cheshire. [X0

Bat.

6h.p. Bat-Jap (perfect) Combination, Armstrong speed, kick start, Montgomery sidecar, guarante 33 gns.—Postmaster, Irchester. [2

Bradbury.

BRADBURY 4h.p., 3-speed; £25; E.P. or excha —The Service Co., 292, High Holborn, W.C. [X0

B.S.A.

2¾h.p. B.S.A., Minerva, U.H. mag., B. and B., fect; £8.—198, Town Rd., Edmonton. [2

1915 B.S.A. 4¼h.p. Combination, accessories; gns.—Vickers, 66, Fulton Rd., Sheffield. [X0

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B.S.A.

L AE 1916 4¼h.p. B.S.A. Combination, new condi on, little used, also petrol; £60, or offer.—Wade, Che Lane, Stamford. [X0709

B A. Combination, 3-speed, all-chain model, Jnne, 917, as new, lamps, etc.; £73, or near offer.—Aro le, Bath Rd., Woking. [2690

B A., 4¼h.p., chain-cum-belt, Nov., 1916, ridden 2,500 miles, perfect condition; 50 gns.—A. H. He n, Chestnut Av., Hessle. [X0659

B A. (May, 1917) Motor Cycle, Model H, completely quipped, and coach sidecar; appointment.—Burtensha 129, Wimbledon Park Rd., Southfields, S.W. [2769

3 .p. B.S.A., free engine, clutch, Bosch mag., complete with lamp, horn, and accessories, perfect coa ion, new tyres; £30.—Millard, 15, Avon Rd., De es, Wilts. [2774

B A., war bargain, genuine 1916, 4¼h.p., all-chain drive, clutch, kick starter, 3-speed gear, used very litt all accessories, powerful and speedy, guaranteed per t; first £45 secures, or close offer.—Millard, Sy ham Rd., Guildford. [X0718

E .A. Combination, new January, 1917, 4¼h.p., countershaft 3-speed, new Dunlop tyres, lamps, ho speedometer, B.S.A. sidecar, hood, wind screen, lug ge carrier, guaranteed perfect throughout; £65.—Th Premier Motor Co., Aston Rd., Birmingham. [2766

Calthorpe.

C LTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits re ired.—P. J. Evans, 91, John Bright St., Birmingh. [X0654

1 16 Calthorpe, 4h.p. twin J.A.P. engine, Calthorpe coach sidecar, Enfield 2-speed gear, beautiful co ition; £65; exchange offers.—136, Lavenham Rd., S hfields, S.W 18. [2744

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C MPION. 3½h.p., Bosch mag., 3 speeds, tyres, belt nearly new, lamps, good running order; £14.— Turpin, 72, Commercial Rd., Grantham. [2700

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C HATER-LEA, 8h.p., large sidecar, Bosch mag., 3-speed countershaft gear, fully equipped, splendid r ning condition, suitable for heavy business work; a pt £48.—Geldard, Broomhill Terrace, Warwick Rd., I ley. [X0708

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C LYNO 1913-14 Combination, 5-6h.p., 3-speed, spare wheel, lamp set, Cowey speedometer, horn, etc., e £59/10; extended payments or exchange.—Service , 292, High Holborn, London, W.C.1. [X0745

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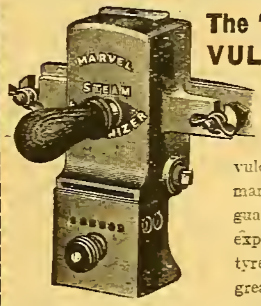

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ENFIELD Combination, 6h.p., 1916, good condition; £65.—Box L5,384, c/o *The Motor Cycle.* [2788

FOR Sale, 3h.p. Enfield Twin, 1917, shop-soiled; what offers?—St. John's Garage, Ltd., Whithorn. [2705

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ENFIELD 1915 6h.p. Combination, hood, screen, 3in. tyres, splendid condition; £55.—29, St. Leonard's St., Bow Bridge. [2752

ENFIELD Late 1914 6h.p. Combination, like new, not ridden last two years; what offers?—29, St. Leonard's St., Bow Bridge. [2753

ENFIELD 1914 6h.p. Coachbuilt Combination, grand condition, accessories; £42, bargain.—131, Green St., Forest Gate, E.7. [X0678

ENFIELD Combination, 1917, 6h.p., 3 Lucas lamps, horn, wind screen, special mudguard, luggage grid; £90.—Jones, Garage, Droitwich. [X0247

ENFIELD 6h.p. Combination, 1915-16, only done 400 miles, perfect condition, every accessory; fullest trial; 75 gns.—Wright, Sanacre, Parkstone, Bournemouth. [X0385

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HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0731

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HUMBER, 3½h.p., single speeder, £11/10; 3½h.p., 2 speeds, £19/10.—Motor Exchange, Horton St., Halifax. [2725

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INDIAN. 1913, 7-9h.p., 2-speed, spring frame, overhauled; what offers?—114, Palace Gates Rd., Wood Green, N.22. [X0697

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INDIAN 1914 7-9h.p. Combination, free engine, Millford sidecar, clutch, electrically equipped, speedometer, tyres good, fine condition; £41.—7, Codrington Mews, Blenheim Crescent. By appointment. [2739

7-9h.p. Indian, with 30 gn. Gloria sidecar, 3 electric lights, horn, speedometer, spring frame, kick, carriers for petrol, luggage, tyres, new Palmer, Dunlop, spare cover, tubes, 10 gns. worth spares, insurance; bargain, £55.—Jullerot, R.N. College, Greenwich. [2696

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1916 T.T. Indian, 7-9h.p., clutch, perfect, 39 gns.; 1915 ditto, disc wheels, 39 gns.; another, 37 gns.; 1914 ditto, 33 gns.; 1915 7-9h.p. spring frame Indian and coach sidecar, 59 gns.; 1914 ditto, 49 gns.; 1912 Indian, 5-6h.p., cane sidecar, 2-speed, 29 gns.; 1914 spring frame 7-9h.p. Indian, 2-speed, 36 gns.; 1915 5h.p. Indian, 3-speed, 38 gns.; nearly new Indian coach sidecar, perfect, 11 gns.; also Indian, 2-speed gear, frame, mag., and engine.—'Phone: Hampstead 5392 or 4904. (D) [2641

James.

JAMES Combination, countershaft, chain, kick, smart, powerful; sacrifice price, or part exchange.—18, Gowlett Rd., Peckham. [2775

JAMES, all models, new and second-hand; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0744

JAMES 1916 Combination, Lucas dynamo lighting, Stewart speedometer, price £78; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X0747

JAMES 1913 Coachbuilt Combination, 3 speeds, clutch, all new Dunlop tyres, lovely condition; £31/10; fitted for business purposes if required.—Bunting's Motor Exchange, Masons Av., Harrow. [2778

Lea-Francis.

LEA-FRANCIS, twin J.A.P. engine, 2-speed, countershaft, kick starter, footboards, oversized tyres, perfect running order, not used last two years; £32.—Lieut. Hunter Smith, c/o Merilees, Cedar Av., Chelmsford. [2734

Levis

LEVIS, 1916, 2-speed, 2¾h.p., only done 1,000 miles.—Box L5,382, *c/o The Motor Cycle*. [2786

1916 Levis, 2½h.p., Bosch mag., with lamps, complete, all in perfect order; a bargain, £23.—R. W. Burman, Elmdon, near Birmingham. [X0650

1915 2¾h.p. Levis de Luxe, Bosch mag., Senspray carburetter, 2-speed countershaft gear, as new throughout, small mileage; 28 gns.—Frank Stacey, Castlefields, Buckingham. [X0711

Matchless.

MATCHLESS 8h.p. Combination, new, fitted with J.A.P. or M.A.G. engines; extended payments or exchanges.—Service Co., 292, High Holborn, London, W.C.1. [X0746

MATCHLESS, 1917, 8h.p. J.A.P., War Model combination, complete with spare wheel, 3 electric lamps, mudshields, etc., brand new, not done 50 miles; price £105; seen in London.—Box L5,375, *c/o The Motor Cycle*. [2706

New Hudson.

NEW Hudson, 3½h.p., 3-speed, clutch, Bosch mag.; £33/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0726

New Imperial.

CROW Bros., Guildford.—New Imperial, latest 2½h.p., 3½h.p., 6h.p. models in stock; also sound second-hands. [1047

1915 New Imperial-Jap, 2½h.p., 2 speeds, accessories, good order; £23, close offer.—Gwinn, Vicarage, Sheringham. [X0754

IMPERIAL-J.A.P., 2-speed, clutch model, £32/10; also new models in stock; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0727

1917 New Imperial-Jap, absolutely equal to new; 32 gns.—Julians, 84, Broad St., Reading. 'Phone: 1024. Closed Wednesdays 1 o'clock. [0932

NEW Imperial-Jap, 1916, 2½h.p., 2-speed, E.I.C. mag., T.T. bars, mechanical horn, new tyre, all accessories, excellent condition, will do 100 miles to the gallon; £27.—Plummer, Rookwood, Luton. [X0631

NEW Imperial-Jap, 1915¾, 2¾h.p., 2-speed countershaft, 2 lamps, horn, accessories, new belt, Dunlops, recently overhauled, splendid road condition; £25, bargain.—S.H., Gordon House, Heanor Rd., Ilkeston. [X0682

NEW Imperial Motor Cycles, 2 speeds, clutch and kick starter, and lady's models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [X0655

Norton.

NORTON, 1917 T.T. model, fitted with disc wheels, very fast mount; price £55.—R. M. Nesbitt, Hildenborough, Kent. [X0594

NORTON.—Big 4 Military Model, all-chain; also chain-cum-belt; £57/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X0733

NORTON, 1915, Big Four, chain drive, S.A. countershaft gear, C.B. side chair de luxe; £55 net cash, complete, 3 lamps, and one new cover and one retread.—C. Middlebrook, Church St., Preston. (D) [X0597

THE MOTOR CYCLE
ESTABLISHED IN 1903
A posse ad esse
AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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The Motor Spirit and Gas Restriction Order. Some Comments.

IN the words of the official notification to the press accompaning this Order, "Experience gained from two months' working" has enabled the authorities "to clear up points on which some doubt was found to exist."

From the continued correspondence on the subject from various readers of *The Motor Cycle*, it is quite evident that the previous Order was not clearly understood.

The definition "any inflammable liquid substance capable of being used for the purpose of driving internal combustion engines, whether such substance has been, or is liable to be, taxed or not," and the definition of gas—"any form of gas capable of being used for the purpose"—render it now quite clear that no fuel is left open to the motor cyclist if we except solid fuel, to enable him to use his machine as he thinks fit, so those who write to us and ask if paraffin or acetylene gas may be utilised now have a plain answer to their question.

The definition of a "private" motor vehicle means a motor vehicle on which the motor car duty is payable. This means to say that the sidecar machine used solely for business purposes cannot be held to be exempt from the local taxation licence, nor can its owner be entitled to receive free-of-duty petrol unless the vehicle is made exempt under the heading "trade vehicle," which means a vehicle constructed or adapted solely for use, and used solely for the conveyance of goods or merchandise in the course of trade, and whereon the full name and address of the owner are legibly painted in letters not less than one inch in length.

The Order also deals with the question of motor vehicles plying for hire. As these do not directly concern the motor cyclist it is only necessary to say that the most important alteration has been that, in future, motor cabs will not be allowed to ply for hire at a distance greater than three miles beyond the boundary of the area in which they are licensed.

The other principal points of the Order affecting motor cyclists are clearly enumerated in the brief extract which appeared in *The Motor Cycle* of the 10th inst., page 36. A few notes, however, concerning these paragraphs are desirable.

The paragraphs under the two headings, "Necessary Household Affairs" and "The Performance of a Public Duty," render it quite obvious for what purposes a motor cycle may be used by a private individual. It is very interesting to note that under the heading "Red Cross Purposes" those motor cyclists who still have their machines in commission may, if the medical officer of a hospital certifies that drives for wounded soldiers are necessary, perform the good work of giving these men an airing for a distance not exceeding twelve miles.

Yet another point worth emphasising is that it is permissible for the holder of a motor spirit licence or gas permit to deliver a motor cycle by road in connection with a *bonâ-fide* sale or intended sale of such vehicle, provided that the seller has obtained a permit from a superintendent or other chief officer of police in the area in which the motor vehicle is kept.

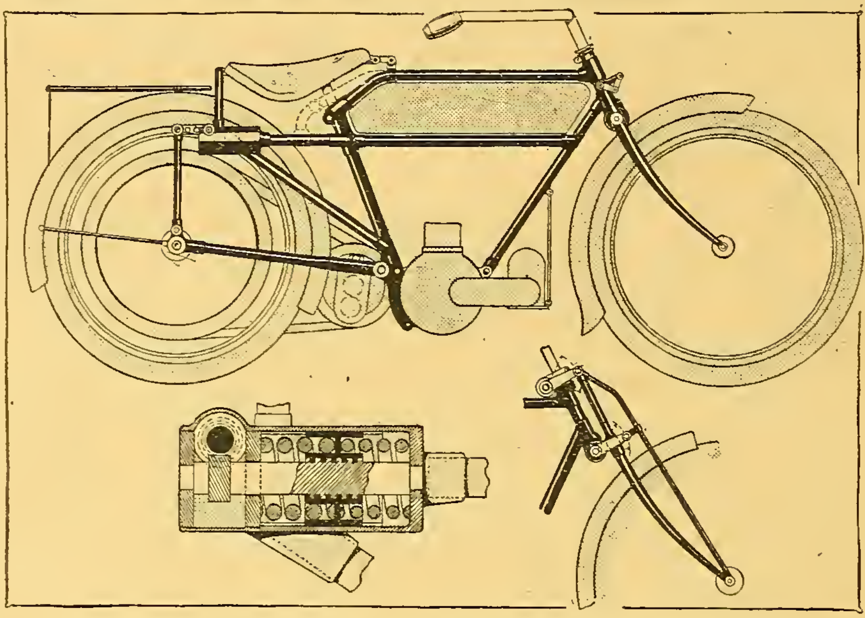
Mention was also made in our comments as regards the matter of special permits. These, of course, will be only issued under special conditions. It is possible that a permit will be issued to anybody, even if he be not the holder of a licence, who is anxious to deliver a machine by road to the prospective purchaser; to officers and men of the Services home on short leave from one of H.M. ships, or from one of the fighting fronts; and to a certain few highly privileged persons. Permits are not granted to Home Service men on leave.

The other chief novelty of the Order is that gas and petrol both now come under the same heading, but with this difference: that the quantity of gas is not limited, though its use is restricted in the same manner as petrol.

An index to the advertisements in this issue will be found on the page facing the back cover

FRICTION SPRINGING FOR MOTOR CYCLES.

A System combining the Properties of a Friction and Spring Shock Absorber.



A rear and front wheel springing device provisionally patented by Mr. T. Slaughter.

THE springing systems illustrated herewith are protected by Mr. T. Slaughter, 56, Parkside, Coventry, and aim at a combination of desirable features, without which any springing system must inevitably fall short of perfection. So far as weight and general adaptability are concerned, coil springs are infinitely superior to laminated leaf springs, and the only reason why the latter are so universally adopted in motor car and cycle practice is that, while possessing good springing properties, they also offer a certain frictional resistance which deadens rebound. A coil spring deadens shock as well as, or better than, any other type, but the great stumbling block in the way of its general use is that its reaction is so rapid and forcible that it is not conducive to comfortable riding. Obviously, then, if we can obtain the natural merits of the coil spring, and by some means deaden its rebound—as in car practice friction shock absorbers are used to steady the motion of the body—we have arrived at what contains the elements of a desirable springing system.

The manner in which the idea here shown is adapted to a motor cycle is a matter for the individual designer to decide. The idea is to throw the load upon the coil springs in such a way that considerable energy is spent in friction, so that hasty action of the spring is retarded.

The Working Principles.

The drawings are self-explanatory. Dealing with the rear portion of the frame, it will be seen that a barrel-shaped casting is located under the saddle, and contains two helical springs (shown also in section), one on either side of a travelling nut mounted on a very coarse pitch screw or worm. The nut is splined to the barrel and free to slide axially. To the end of the worm axle are attached cranks drilled for adjustment, and these are hinged to the rear stays in a suitable manner.

The heavy spring carries the load, while the lighter one absorbs rebound, the friction of the worm steadying the motion of the springs.

Two methods are shown by which the idea can be brought into practice for front wheel springing—the system shown in the drawing of the complete machine being in effect similar to the present Triumph arrangement. In this the shock absorber occupies the position of the central pivot. In the other drawing two shock absorbers are utilised, the arms that bring them into operation corresponding with the links of the Druid system.

The inventor states that a special feature of his idea is that the shock absorbers can easily be adjusted to suit the required load—a desirable feature, we admit, though we fail to see just how it can be brought into effect in the case of the front wheel springing. Perhaps adjustability for weight is more essential in the rear than in the front springing, but there is no doubt that adjustable front springing would be a very valuable asset.

AUSTRALIAN IMPORTS.

THE following statement is furnished by the Department of Trade Customs, setting out the imports into each State according to the country of origin:

FIRST SIX MONTHS, 1916.

Country of Origin.	N.S.W.	Victoria.	Queensland.	South Australia	West Aust.	Tasmania.	Comm'nwealth.
	£	£	£	£	£	£	£
U. Kingdom ..	19,253	13,845	2,375	4,536	4,569	1,071	45,649
France	—	7	—	—	—	—	7
U.S. America .	17,154	22,713	8,289	18,949	2,958	3,613	73,676
Total	36,407	36,565	10,664	23,485	7,527	4,684	119,332
Duty collected .	9,124	11,875	3,108	6.662	1,750	1,377	33,896

FIRST SIX MONTHS, 1917.

Country of Origin.	N.S.W.	Victoria.	Queensland.	South Australia	West Aust.	Tasmania.	Comm'nwealth.
	£	£	£	£	£	£	£
U. Kingdom ..	3,226	4,323	1,354	4,896	2,015	656	16,470
Belgium	110	—	—	—	—	—	110
Germany	32	—	—	—	—	—	32
U.S. America .	39,024	33,789	6,021	6,214	1,419	4,099	90,566
Total	42,392	38,112	7,375	11,110	3,434	4,755	107,178
Duty collected .	67,899	18,383	10,238	8,534	5,401	939	111,394

Occasional Comments

"By Ixion"

A Curious Pre-ignition.

I SAT recently at the feet of a No. 8 hat who designs engines of umpteen h.p., and who was much annoyed with aluminium. You will be aware, gentle reader, that aluminium is, so to speak, too porous and crumbly to form the actual frictional surface of a motor cylinder, and to use it for that purpose would apparently be analogous to making files out of blanc-mange or stale bread, so they shove liners of steel inside their modern aluminium cylinders. This my friend had done so prettily that his engine weighed about two ounces per horse-power, and all the aeroplane designers of the Allied nations were sitting on his doorstep wildly waving cheque books at him. Unluckily, though engine No. 1 reminded him of his honeymoon for sheer cloying sweetness, engines No. 2 to umpteen pre-ignited at the compression of twenty atmospheres or so with which his maximum b.h.p. of 2,000 or so was partly secured. He lowered his compression down towards the modest ratio current in the humble world of motor cycles, but still this heartbreaking pre-ignition that twisted crankshafts into corkscrews and made con-rods wilt like candles on an August afternoon. I dare not tell you how many thousand pounds of his excess profits went to waste before he tracked the pre-ignition to its lair. Millions of sparking plugs lay littered round the test room floor, and every internal atom of surface was polished with rouge till it positively glittered. At last he found that in one or two patches of each errant combustion chamber there was no contact for conductivity between the liner and the jacket, and these isolated patches ran red hot just as the needle on the dial first flickered up towards the 2,000 h.p. mark. We live and learn.

Habitual Over-oiling.

I DOUBT whether any experienced manufacturer, rider, or repairer would query the assertion that motor cyclists, as a class, habitually over-lubricate. Nor are they to blame. Manufacturers for years past have supplied crude lubrication systems, and have safeguarded themselves by printing in their catalogues the maxim that it is cheaper to over-oil than to under-oil, in sublime oblivion of the obvious, but suppressed, consideration that it is impossible either to over-oil or to under-oil a properly designed engine. Thanks to the irritations of a crude lubricating system, further adorned by an inefficient sight gauge, very few owners take the trouble to master the oiling vagaries of their machines, and many of us ride by the rule of thumb—"when in doubt give it a pumpful." Consequently, the majority of motor cyclists use nearly as much oil in, say, 1,000 miles as a light car driver would use in the same distance. In the one case a 500 c.c engine is propelling a load of about 4 cwt.; in the other, a 1,500 c.c. engine is propelling about 15 cwt. Yet the oil consumption is approximately the same; and, even at that, the average light car consumes from two to three times as much oil as is absolutely necessary. In other words, the average motor cycle driven by an average owner very probably consumes about six times as much oil as is technically essential, and not all of the wastage is through the tappets either. There are canny owners of the dirtiest types of engines who, by keeping everything free and studying their adjustments, get a clean engine, slow carbonisation, and a low consumption at the price of much concentration. But the trade's ideal should be an engine which automatically keeps itself clean and automatically runs 4,000 m.p.g. of oil.

Revs or Anti-revs?

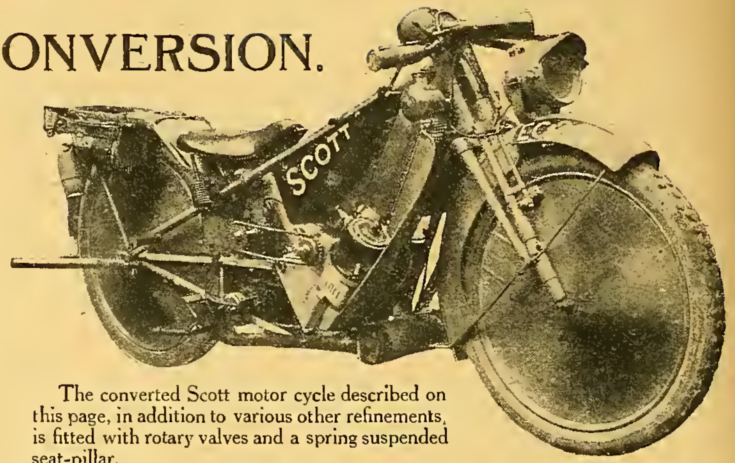
"MINORITIES must suffer—it is the badge of their tribe." But I always sympathise with minorities and I fancy this particular minority is a trifle unreasonable. Granting that you can get a glut of speed from a big slow-running twin, one must remember that such a machine would be little, if any, faster than a T.T. Norton; little, if any, better on hills; and about twice as heavy. The modern T.T. machine does not sell by the thousand, and the rival type of speed mount would not sell a quarter as well, simply because it is so clumsy to handle. Incidentally, many speed men want a machine that is fast on the level, and yet requires no humouring on hills, and this is where the variably geared revver tickles them as against the leviathan single-speed plodder. Want of *handiness* is largely responsible for the dearth of fast single-speeders. Secondly, the sidecar has exerted a colossal influence on design. The single-speed sidecar is *na poo*, a variably geared sidecar with the non-revving type of engine was apt to be a creeper on hills, and so we arrived at heavy, revving machines, capable of 40 m.p.h. on second. The makers design what will sell, and malcontents must not curse the press or the trade for the present state of things, but rather the public.

A Concession.

IT must, however, be admitted that nobody has seriously tried to make the best of such a type as the old 2¾ h.p. Excelsior or 3½ h.p. Quadrant in the light of modern knowledge. Now and again we strike a modern engine which reminds us of them by its dogged top gear work uphill but the experience is unusual. They would go practically anywhere on a 4 to 1 or 4½ to 1 gear, and they ran about 40 m.p.g. better than the modern 3½ h.p. without being anything like as fast. Moreover, unless memory betrays me, they were nothing like as pleasant to sit over. Perhaps some compassionate maker will notice that there are quite a lot of riders who continue to sigh over the lost possibilities of the old stolid type of engines, and will see whether he can in the light of modern knowledge make a roadworthy job of one.

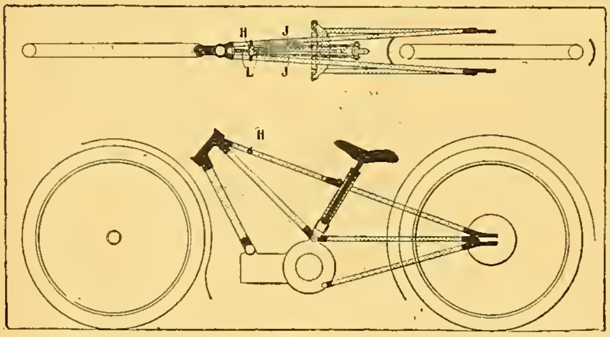
AN INGENIOUS CONVERSION.

Some Excellent Ideas carried into Effect in a Scott Motor Cycle.



The converted Scott motor cycle described on this page, in addition to various other refinements, is fitted with rotary valves and a spring suspended seat-pillar.

THE clever spring-seat frame design illustrated on this page is the work of Mr. L. S. Parker, of Messrs. James Parker and Sons, motor cycle specialists, of Kendal. It will be observed that the design permits vertical and longitudinal movement of the saddle, thereby affording the rider all the luxuries of springing, while in no way detracting from the rigidity of the frame. The illustrations below show the inventor's ideas for the application of the principle to a two-stroke machine to be known as the L.S.P., which he is designing, but the idea has been adapted to an ingeniously converted Scott, and has been put to a thorough road test, giving unqualified satisfaction hitherto. It will be seen that the bottom of the main seat tube is pivoted to the frame adjacent to the top engine support. The tube is of large diameter and contains a compression spring which intercepts vertical movement between the frame and the rider. In addition to this the seat tube is permitted an adjustable range of longitudinal movement, being suspended by the tension springs J J and the compression spring L, the latter acting chiefly to check the rebound. The bridge H is brazed to the two main struts running from the top of the steering head to the back wheel, so that the suspension of the seat tube in no way interferes with the general strength and rigidity of the frame. The frame, in fact, is a complete unit in itself, capable of withstanding all strains and stresses quite independently of the seat tube, which merely functions to support the rider. It will be observed that truly triangular construction is adhered to throughout, and the design would appear to be on excellent lines.



Frame design for L.S.P. two-stroke lightweight, with adjustable compound springing device. The principle has been adopted in the Scott conversion.

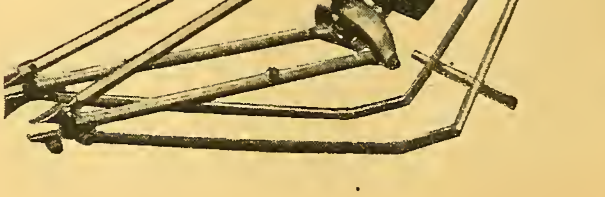
We are not informed what type of engine it is proposed to fix in the horizontal position shown in the drawing, which is a position we would venture to criticise. It would appear to us that a cylinder so placed is somewhat exposed, and there is not much advantage to be obtained by fixing an engine horizontally, unless the distribution of the cylinders demands such an arrangement.

As stated, the principles involved in the above design have been carried into effect on a converted Scott motor cycle, of which a photograph is reproduced; this certainly conveys the impression of being on very attractive lines.

An Ingenious Conversion.

It will be observed that the upper portion of the frame—that is, the two main struts running from the steering head to the back wheel—and similarly the suspended seat-pillar, have been added to the existing Scott frame, a large triangulated tank occupying the space in front of the saddle-pillar. These additions have increased very considerably the rigidity of the frame, quite apart from the comfort derived by the spring suspension.

Structural alterations have also been made to the engine, which, as will be seen from the drawings, has been fitted with rotary valves. The components of the rotary valve mechanism are shown in a separate illustration, the valve itself consisting of a sleeve running in a hardened steel liner. The inventor does not state what provision has been made for lubrication, but we gather that it would be a simple matter to take the drip feed supply directly through the outer casing of the rotary valve, thus permitting the oil first to circulate round the sleeve, then pass on to the respective crank case reservoirs. Petroil, of course, would



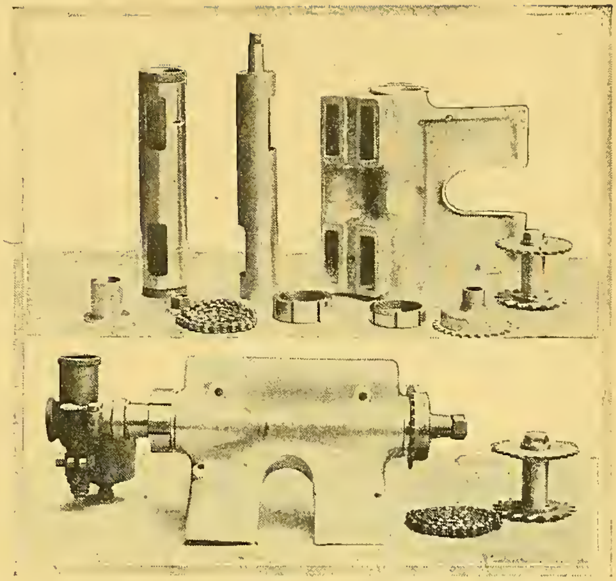
The frame of the converted machine, showing clearly what additions have been made to the original Scott frame.

An Ingenious Conversion.—

similarly solve the problem, and would, perhaps, lead to more even distribution of the oil.

The rotary sleeve is driven by a chain from the magneto, on the shaft of which two sprockets are fitted. The first sprocket takes the drive from the countershaft in the usual way, and the second, which conveys the drive to the rotating valve sleeve, is mounted on an extension of the magneto-shaft. This arrangement is not to be encouraged, as magneto bearings are not designed to stand the considerable drag thus imposed; in fact, magneto manufacturers are emphatic in their statements that it is preferable to drive a magneto by means of a train of pinions rather than by a chain, on account of the drag created by the latter.

We certainly think that Mr. L. S. Parker is to be complimented on his work, and on the attractive and sporting lines presented by the converted machine. Unfortunately, we have no details of the machine's behaviour on test other than that, as already stated, it has given unqualified satisfaction. If, however, the execution of the various ideas is carried out in a satisfactory manner, the machine should show many road qualities that will appeal to all classes of riders. Present-day developments tend strongly towards frame springing, and interest in novel engine design seems to have been seldom keener.



The rotary valve unit adapted to Mr. L. S. Parker's Scott. The two vertical members on the top photograph are the rotating sleeve and steel lining, the aluminium casting fitting on the existing crank case transfer port flanges. The bottom view shows the unit assembled.

* * *

A Board of Trade Publication.

A New and Valuable Series.

THE Board of Trade on January 3rd issued the first number of a new series of the *Board of Trade Journal and Commercial Gazette.* This new series is intended to cover the whole sphere of British commercial and manufacturing enterprise, and to give every information to business men and manufacturers likely to be of use in the development of their enterprises, and so of British trade as a whole.

Giving the All-clear signal in a London suburb.

The *Journal* for January 3rd contains a most valuable and instructive "Foreword" by the President of the Board of Trade, which contains most useful advice. The whole *Journal*, of course, is devoted to treatment of potential markets in all kinds of articles and all over the world.

Advice and an Appeal.

The following are two extracts from the "Foreword": "No Government Department can, in my opinion, secure success for our trade unless the traders and manufacturers themselves simultaneously put forth strong efforts on their own behalf. The ultimate success must depend upon the traders and manufacturers themselves.

"We propose to give the widest publicity possible to our daily work, and to open the door to suggestions and advice, and in return we ask for the great business world to meet with us frequently in spirit of friendliness and co-operation actuated by one motive only—the advancement of our trading interests in all parts of the world."

"Help us to make it possible to show through the pages of the *Journal* a constant and steady growth in our trade."

Another passage in the "Foreword" says: "The Board of Trade is being recognised and strengthened, and in an early issue of the *Journal* a full explanation of the changes will be published."

To the Wild Valley of Madeira.

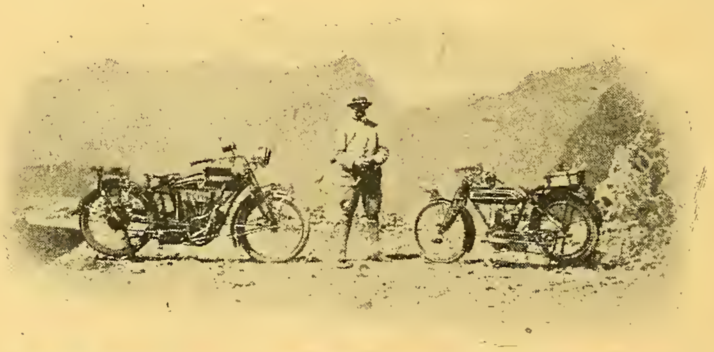
A 2½ h.p. NEW IMPERIAL AND A 7-9 h.p. INDIAN ON THE PASS OF ST. VINCENT.

NO, this is not another solution of the fuel problem; Fire Bicycle is merely the name that the rising generation of Madeira has for the motor cycle. The now familiar teuf-teuf of my New Imperial in the distance seems to have a spell akin to that of the pied-piper, and draws a swarm of swarthy little kiddies to the windows and into the streets to see the fire bicycle.

I have a mascot—a little brown monkey with a red collar and a blue hat—which perches on my front mudguard where the number-plate should be but is not, and this wards off accidents. It seems to be a never-failing source of joy to the juvenile population, and a perfect howl of delight goes up when they catch sight of it, while a dozen little hands point it out to me as though I had not noticed it before.

The Wild Valley.

Reliability trials, club outings, etc., are unknown here, consequently the enthusiastic rider has to fall back on his own initiative. As I had never been for a really long ride yet, I button-holed a pal—rider of a 7-9 h.p. Indian — and persuaded him to come with me on the next holiday on a lengthy tour. I had in my mind's eye a distant valley which cuts into the heart of the island from a considerable distance along the coast, aptly named in Portuguese "Ribeira Brava"—the Wild Valley. A new road had been lately built connecting Funchal with the village at the mouth of the valley, and leading up to a high and little-known pass at its head—the pass of St. Vincent.



In the "Ribeira Brava." Cooling the engines after a spell of low gear work.

Ours would be the first motor cycles to attempt this feat—a fact which added zest to our scheme.

We had heard that last winter's rains had wrought considerable havoc with the road, as it had not yet been paved; nothing daunted, however, we started off cheerfully one morning at 10.30 with full tanks, and lunch baskets strapped on the carriers.

Truly ignorance is bliss! What followed was one of the most nerve-racking experiences I have ever gone through. The first lap we did in fine style, all out for a considerable part of the way, and arrived at the village of Cama de Lobos with appetites whetted for what was to come, the road from there on being unknown to us. It soon became evident that there was some truth in what we had heard about the state of the road. Climbing steadily, we presently encountered a stretch six inches deep in loose sand, where it was all one could do to keep upright; this was followed by a piece of hard surface liberally scattered with sharp stones of a size varying from that of an apple to a football. The second lap, therefore, had all to be done on bottom gear, the engines rapidly warming up. Eventually, after several stops to cool down, we reached the summit of Cabe Girae, 2,000ft. up. Had it not been for the jibes of the scoffers who saw us start, we would now have turned back, but hoping for better luck we started off once more. What followed beggars description.

Although the road led downwards at a gentle slope, hardly ever was it possible to get into top gear. Potholes and ruts followed one another in endless succession, their monotony being broken at intervals by stretches of loose sand or a few hundred yards of rock-strewn earth track. We did not see much scenery this trip save for an occasional glimpse over some terrific precipice at the opalescent Atlantic far below, all our time being occupied in keeping our saddles. Arrived at the village, we swallowed several bottlefuls of "corpse reviver," and thus reinforced proceeded up the valley. The road improved slightly, and we had some opportunity of admiring the scenic wonders of the Wild Valley. Stupendous buttresses of weather-beaten rock towered to an immense height above us, thin whisps of mist crowning their lofty summits. Great fissures showed in the faces of the cliffs—proofs of subterranean energies of a bygone age. Pinnacle after pinnacle was marshalled in succession up the valley, and stood out like sentinels against the ethereal blue of the heavens, till the ranges finally merged in the central backbone of the island. At last, with red-hot engines we struggled up the last incline to the famous pass—the first motor cycles to reach it, and, I venture to prophesy, the last for a long time. From here a magnificent view was obtained down the two great valleys to the north and to the south, the sea being visible on both sides of the island through a haze of intervening mist.

To the Wild Valley of Madeira.—

We attempted to lunch here, but the banquet we had provided proved rather a fiasco; on opening the basket we found that eggs, sandwiches, meat-balls, cherries, and cakes had been mashed up together into a glutinous mass, which was doubtless very nutritious but hardly appetising. The return journey was much the same as the outward, consisting of skids, recoveries, bumps, jolts, and other phenomena of shocking roads with which most motor cyclists are acquainted.

The whole trip took us eight hours, and the distance covered was approximately forty-eight miles. Deducting two and a half hours for stoppages, this works out at an average speed of eight and threequarter miles per hour. The only trouble experienced was a stretched exhaust lifter cable on my machine, not a single puncture or breakage being sustained.

Both the Indian rider and I felt ill for several days after, and I had to tie a soft cushion on to the saddle of my machine for some time, in order to make riding possible.

Thus an Indian and a New Imperial together conquered what many thought to be impossible for a motor cycle. R.K.

Lubrication in Internal Combustion Engines.

The Object of Imposing an Oil Film between Bearing Surfaces.

THERE is no such thing as a perfectly smooth bearing. All bearings when viewed under a microscope are seen to have minute projections and declivities. These irregularities cause friction and abrasion when bearings are in motion. This fact is apparently realised by many professional racing men who use graphite with their lubricating oil. The graphite is supposed to fill in the irregularities of the bearing surfaces, and thus to present smoother surfaces which to some extent eliminate friction.

At the same time, however, the use of an oil is essential. If two sheets of plate glass, most carefully finished, are laid on each other it will be found almost impossible to move one over the other. If oil is interposed between the two movement is easy. If water is interposed between the two movement is still possible but with not such ease as with the oil.

Fluid Friction.

From the foregoing some idea may be obtained as to the reasons why oil is used as a lubricant. The oil spread over the glass has sufficient "body" and adhesion to withstand without rupture the pressure of the sliding glass, and thus maintains a layer of fluid between the moving surfaces.

The film of water, whilst not being entirely forced from between the surfaces, is ruptured in places, thereby allowing the two plates of glass to come into local contact, and consequently to produce more friction which has to be overcome by more power. It will readily be seen that where the surfaces touch, abrasion and consequently wear of those parts will occur.

Lubrication, then, is the art of the interposition of a film of fluid between bearing surfaces. This obtained the bearings are "floated," movement is facilitated by reduction of friction and wear is reduced for the same reason.

Gradual Pressure and Sudden Shocks.

It is a fact that there are steam engine cylinders which have been running for years and are to-day in as good condition as on the day of their erection. Such reduction of wear is impossible with the internal combustion engine owing to the fact that every power-stroke, and every obstruction met whilst running, transfers the shock of impact to all the bearing parts with possible rupture of the oil films between the bearing surfaces. It is generally understood that a body will withstand a constant pressure of many times the force of a sudden pressure.

This applied to the multitude of shocks received by the oil films will explain the comparatively short life of the bearing surfaces of an internal combustion engine. All internal combustion engine lubricating oils carbonise in use. The blue smoke issuing from the exhaust after a period of over-oiling is due to the absence of sufficient air to allow of complete combustion of the oil which has been volatilised by the heat of the engine. The carbon is then liberated in its free state.

Some of the carbon formed during an over-oiling period, and also some carbon from the carbonisation of the oil during the whole period of running, attaches itself to the inner steel parts of the engine owing to the affinity of steel for carbon at high temperatures.

The Desiderata of a Lubricating Oil.

The qualities needed in a lubricating oil for internal combustion engine use are:

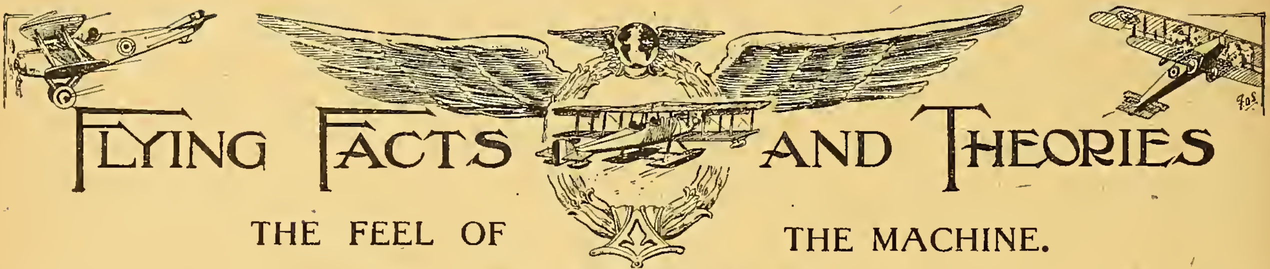
(1.) Sufficient "body" at the temperatures reached to withstand shocks without rupture.

(2.) Fluidity to enable a quick return to unruptured state after rupture.

(3.) Burning point sufficiently high to withstand without excessive volatilisation the temperature of the engine.

As all of these qualities cannot be obtained in their highest degree without injury to another quality, a compromise is effected by oil manufacturers. The whole subject of lubricating oils and lubricating theory is indeed in a rather undeveloped state at the present time, and there is ample scope for research and experiment.

All these internal combustion engine oils contain mineral hydrocarbon oils of different series and sources. The chief sources are the United States and Caucasia. The crude petroleum oil is found naturally oozing from the ground or is reached by boring. The crude petroleum is refined by distillation in stills. The most volatile and inflammable of the hydrocarbons form the first distillate. The lubricating oils are obtained towards the latter end of the distillation, and also from the residue in the still. These fractions form the least volatile of the hydrocarbons contained in the original crude petroleum, and by chemical manipulation and filtration the final lubricating oil is obtained. R.M.



FLYING FACTS AND THEORIES

THE FEEL OF THE MACHINE.

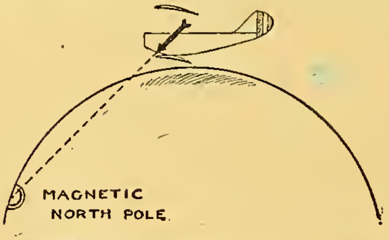
By W. G. ASTON, A.M.I.A.E.

THE points raised by some of my opponents, notably "O.J.F.S.," with his professed dependence upon the "feel of the machine" as a source of information, suggest that it may not be without interest to consider to what extent a pilot may know what he is doing when the atmospheric conditions are such that he cannot see the earth. If only the machine itself is visible it is obvious that no direct visual indication is given which can determine its position or motion in space. It may be, for all the pilot is made aware through the sense of sight, equally well looping the loop, climbing, diving, side-slipping, turning, or flying upside down, as travelling straightforward. If the machine is cut off from the earth by a sea of cloud, though itself is flying in comparatively clear air, conditions are by no means so bad, since certain features of the cloud-sea will act as relatively fixed points in space whereby the pilot can tell if he is turning or otherwise going off his course, and detached clouds above the "sea" will similarly prove useful guides. The worst possible weather conditions are snowstorms and fogs, since neither of these has, as it were, any bottom through which the pilot can descend into a clearer atmosphere, hence a safe landing is rendered exceedingly difficult. As far as knowledge of what the machine is doing is concerned, however, the results are the same if the conditions are such that no landmark whatever (and this term includes cloud features) is visible.

Human Sensations.

Fortunately, sight is not the only sense which can indicate what is happening to the aeroplane, and also, fortunately, no amount of cloud, fog, or snow can possibly affect gravity. Fortunately again, the organs of the human body are so nicely suspended and so sensitive to changes of motion that it is in itself an excellent form of accelerometer, if an inaccurate one. Thus the pressure between the person of the pilot and the seat which carries him will undergo a great increase if the aeroplane loops the loop or executes a sharp turn, and this increase of pressure will instantly apprise him that the desired straight course has been departed from. Conversely a change from level flying to a dive will produce a decreased pressure. In certain circumstances this gravity effect may be so high as to cause actual faintness owing to the excessive pressure on internal organs. Unfortunately the human body is not a sufficiently delicate accelerometer to answer to small deflections, and the senses are therefore incapable of registering any but very big variations from the normal course. Even granting that a pilot knows the aeroplane is turning, by his susceptibility to sensations of acceleration, it is almost impossible for him to know, without other evidence, in which direction he is turning, for the same reason that we are ordinarily totally unaware of the direction of the earth's rotation without consulting the sun or a compass.

Recourse has consequently to be had to instruments, and of these the one for which the most obvious need arises is a compass. At first glance it would appear that this can be made easily to show deviations from a straight course even when no external object is visible, but unfortunately such is not the case. It is true that a practically perfect compass can be made, but most compasses fall very far short of this ideal, so that one will not infrequently hear pilots remark that, as soon as they got swallowed up in a dense cloud, "the compass went mad and spun round." The reason of this is as follows. Imagine an aeroplane, fitted with a compass, flying horizontally towards the north. The compass needle, viewed from above, will lie along the axis of the machine, but since, as shown exaggerated in the sketch, it points towards the pole, it, looked at from the side, will be at an angle with the horizontal plane of the machine. This angle is known as the "dip," and in order to counteract it the south-seeking end of the needle is provided with a suitable balance weight, which pulls the freely suspended needle level.



The effect of magnetic dip on a compass needle in an aeroplane.

Faults in a Compass.

Now supposing the machine turns westwards, this involves the introduction of an acceleration acting from right to left. The effect of this acceleration upon the unsymmetrically balanced needle will cause the heavier, south-seeking, end to swing outwards to the right owing to its greater inertia, and therefore the needle, whilst the machine is in such a turn, will tend to remain in line with the axis of the aeroplane, and will consequently make it appear that no turn is taking place. This phenomenon is called the "northerly turning error," and must be eliminated from a compass if it is to be universally effective as a directional guide. When the machine is travelling south this disadvantage does not exist, as, supposing it now to turn towards the east, *i.e.*, towards the left, the needle will immediately show the smallest turn, and moreover show it to an exaggerated degree. To guide oneself whilst flying southwards, or in any direction from east to west, through south, is therefore

Flying Facts and Theories.—

an easy matter. It can easily be appreciated, however, that under the influence of changing centrifugal force the ordinary compass can easily "go mad," though it is nevertheless a perfectly satisfactory instrument if, and when, the pilot can correct himself by means of any "landmark."

Turning now to other instruments, we have, first of all, the air speed indicator. By its side will be an engine revolution counter, and much valuable information is furnished by a close consultation, and correlation, of these dials. Also there is the much-despised level or "bubble" instrument, and the aneroid barometer. The former is practically a very coarse spirit level, and the central position of the bubble indicates that the lateral control of the aeroplane is correct, whether it be flying straight or on a curved path.

The Air Speed Indicator.

Now let us suppose that at 1,500 r.p.m. of the engine the air speed indicator shows 100 m.p.h. when the aeroplane is flying level. If the r.p.m. remain practically constant and the air speed drops off, then the machine must either be turning or climbing, or both. If the air speed increases, then the flight path of the machine must be downward. In either case the descent or ascent, if sustained for only a short time, will be visible on the aneroid. The maintenance of a constant air speed with a constant r.p.m. (*i.e.*, a fixed throttle opening) may be taken, in conjunction with previous observation as to the appropriate figures, to be evidence in favour of a straight course, apart altogether from the behaviour of the compass, though it is not necessarily conclusive, even though the joystick be in the middle and the rudder bar be in its usual position.

The "level" will indicate big "yaws" or sideslips, but it will not easily show up very slow ones.

Some other instrument is therefore requisite for maintaining a straight course in the absence of the ideal compass, though no doubt "O.J.F.S." and others will quickly and justly object that there are quite enough "comic speedometers," etc., already. Either one can have a gyrostat, which for a short period would give one a definite direction, or one can install a device for indicating when the aeroplane is turning and to what extent it is so doing. Both these instruments are perfectly practical, and of the two the latter is undoubtedly the more useful, as by avoiding turns and holding on to a straight course one can coax a refractory compass into sensible behaviour irrespective of the direction in which one is travelling.

Provided they are constantly consulted, the instruments mentioned above, formidable in array though they be, do at least throw a certain amount of light on an otherwise dark situation, especially in conjunction with the pilot's own "sense" of gravity. It is, indeed, difficult to imagine that a series of loops, an upside-down position, a violent sideslip, a rapid climb or dive, whether straight or of the "spiral nose" variety, can be indulged in, and persisted in, unknown to the aviator. A really perfect compass, of course, would materially relieve the troubles of the lost pilot, and the time is probably not far distant when the problem will be satisfactorily solved and this ideal instrument be a standard fitting on all machines.

In the meantime, it is not to be denied that flying in atmospheric conditions which do not permit the pilot to have a direct visual idea of what he is doing is fraught with considerable risk, the gravity of which is dependent upon the structural strength of the machine, since he may perform evolutions, in a vain attempt to get a "mad" compass back to comparative sanity, which will impose dangerous stresses on material. One can hardly blame a pilot, not thoroughly "air-hardened," for suffering from a slight attack of panic in such circumstances.

The Advantage of a Stable Aeroplane.

This is, needless to say, where the thoroughly stable aeroplane shows its great advantages, for no matter in what position it gets, it can always be relied upon to come back to a normal attitude if left entirely to its own devices. I hope to explain some of the reasons why this is so in future articles.

As to what is best to be done when "lost" in space depends upon circumstances. No cloud is infinitely big, and the preservation of a tolerably straight course will bring one out either above or below it, or at one side or the other. Heavy long-continued snowstorms and fog—the two worst enemies of flying—rarely arrive unexpectedly, though it is not difficult to imagine circumstances—long-distance bombing, for instance—in which they are liable to be encountered with no chance of avoidance.

In the ordinary way the difficulty of knowing what one is doing is not complicated by darkness; if the cloud, fog, or snowstorm be dense enough one can see as much, or as little, by night as by day. At night, however, tenuous ground mists that would be sufficiently transparent by day, often appear as opaque as a blanket, but even on the darkest night will probably have sufficient radiance to provide some sort of visible horizon as a basis for direct visual control of the machine. In such an event the additional risk is solely concerned with the ability to make a landing. In the absence of such mists nature has very considerately provided in lakes, rivers, canals, and so forth, areas of radiance which unfailingly catch all available light from above and so provide a practical landmark or horizon.

The Importance of Weather Conditions.

It is because of the value to flying men of accurate predictions of weather that the science of meteorology has acquired such enormous importance in recent years. However perfect in control and economical in fuel the aeroplane is made, it must eventually come down to the earth from which it started. Instruments already in existence are capable of telling a pilot pretty well all he wants to know once he is well up in the air, but no instrument conceivable can show him how to make a landing on ground that is scarcely visible twenty feet below him. The only remedy is, therefore, not to ascend when such weather conditions are likely to arise, and it is to meteorology that one must look for the desired prognostication.

Special Note.—In the ninth line of the left column on the second page of the article on "The Influence of Altitude," which appeared in *The Motor Cycle* for January 10th, the following words appeared: ". . . provided the altitude remains unchanged." This was a printer's error, and should have read: ". . . provided the attitude (*i.e.*, of the aeroplane) remains unchanged."—W.G.A.

Current Chat

Time to Light Lamps

Greenwich Time

Jan. 24th	... ...	5.2 p.m.
,, 26th	... ...	5.6 ,,
,, 28th	.. ...	5.9 ,,
,, 30th	.. ...	5.12 ,,

Special Features

NOTES ON THE USE OF GAS IN PETROL ENGINES.

FUEL LOSS AT CARBURETTER.

1918 MODELS.

Women Motor Transport Drivers.

An Army Council instruction recently issued states that women motor drivers for service at home will be supplied by the Women's Legion, while those for service abroad, other than those working under V.A.D. organisation, will be supplied by the W.A.A.C. When a member of the Women's Legion wishes to serve abroad she will be required to transfer into the W.A.A.C.

Motor Cycling Club.

We are asked to announce that the annual general meeting of the above club will be held at the Monico, Piccadilly Circus, on the 30th inst., at 6.30 p.m., when the accounts for the past year will be presented. It is hoped that any member who sees this notice will make a special effort to be present, and will accept this notice as adequate. As the secretary points out, it is practically impossible to ascertain addresses in the usual way at the present time.

May Petrol be used to attend Religious Services?

Two prosecutions under this heading were reported in our issue of December 6th, one of the cases being dismissed, though in the other the victim (a lady) was fined. The dismissed defendant was a Roman Catholic, and another Roman Catholic (a doctor) recently had the case against him dismissed at Cambridge.

By the *very latest* Order, however, the use of petrol for attending religious services has been definitely forbidden.

Petrol for Coal Miners.

The Auto Cycle Union has done very good work recently in obtaining petrol licences for coal miners, to enable them to ride to and from their work. The other day a Welsh miner wrote to us, and stated that he had been unsuccessful in obtaining any petrol after making due application. We referred him to the secretary of the A.C.U., who took up his case, with the result that he was immediately successful in obtaining a licence for two gallons of petrol per month. This goes to prove that very often when individuals apply to a Government body for a concession they are unable to put their facts forward with sufficient clearness, but when the matter is taken up by a well organised association matters appear in a very different light, and the request is granted.

Imports and Exports. A Record Year!

During the last few months there has been a gradual decrease in the importation of motor cycles, tyres, and accessories. In the month of December the value of the imports was £1,691, a decrease of over £1,000 on the November figures. The number of motor cycles imported was two, valued at £22. What machines they were is difficult to imagine, considering the low amount quoted.

Exports.

The exports for December did not reach those of the previous month, but were higher than those of December, 1916 and 1915.

The total number of motor cycles exported during 1917 was 13,981, as against 12,847 in 1916 and 10,927 in 1915. The value of these (with parts) eclipses all previous records, being £1,216,356. The previous best was in 1914, and totalled £1,168,799. In no other year has a total of £1,000,000 been reached.

	1915	1916	1917
Number of machines ..	1,065	691	867
Value of motor cycles, parts, tyres, and accessories	£90,545	£54,867	£95,907

Petrol Imports for December.

1915	1916	1917
12,983,382	4,100,853	9,556,120

The number of gallons imported during the other eleven months of 1917:

January	13,001,740
February	12,257,984
March	9,246,546
April	10,258,951
May	12,270,934
June	11,327,434
July	12,346,846
August	7,853,368
September	13,278,972
October	13,887,674
November	14,269,893

A Kick-starter for the Zenith.

A reader writes: "Some time ago, at the request of one of your readers, there appeared in *The Motor Cycle* a few articles on home-made kick starters for Zenith machines. I have tried most of these devices but found none of them a success. I would like you, not only on my own account but on that of the large number who ride direct-driven Zenith machines, to invite readers to give their experiences of other home-made kick-starters."

Yankee Talk.

In describing new Indian models an American paper refers to "a horizontally-oppressed twin." We have heard of Yankees who cannot get *accustomed* to the English accent, but we feel simply *overpowered*.

Petroleum Controller for Egypt.

Note that it is a petroleum and not a common-or-garden-petrol controller they are to have in Egypt. In this country petroleum according to the Act, probably paraffin or kerosene according to common parlance, is used more extensively for heating, lighting, and industrial purposes than it is in England, and although some of the fuel is produced in Egypt, much has to be imported. Hence another controller is to be added to the list, which is already alleged to occupy as much space and paper as "The Britannica."

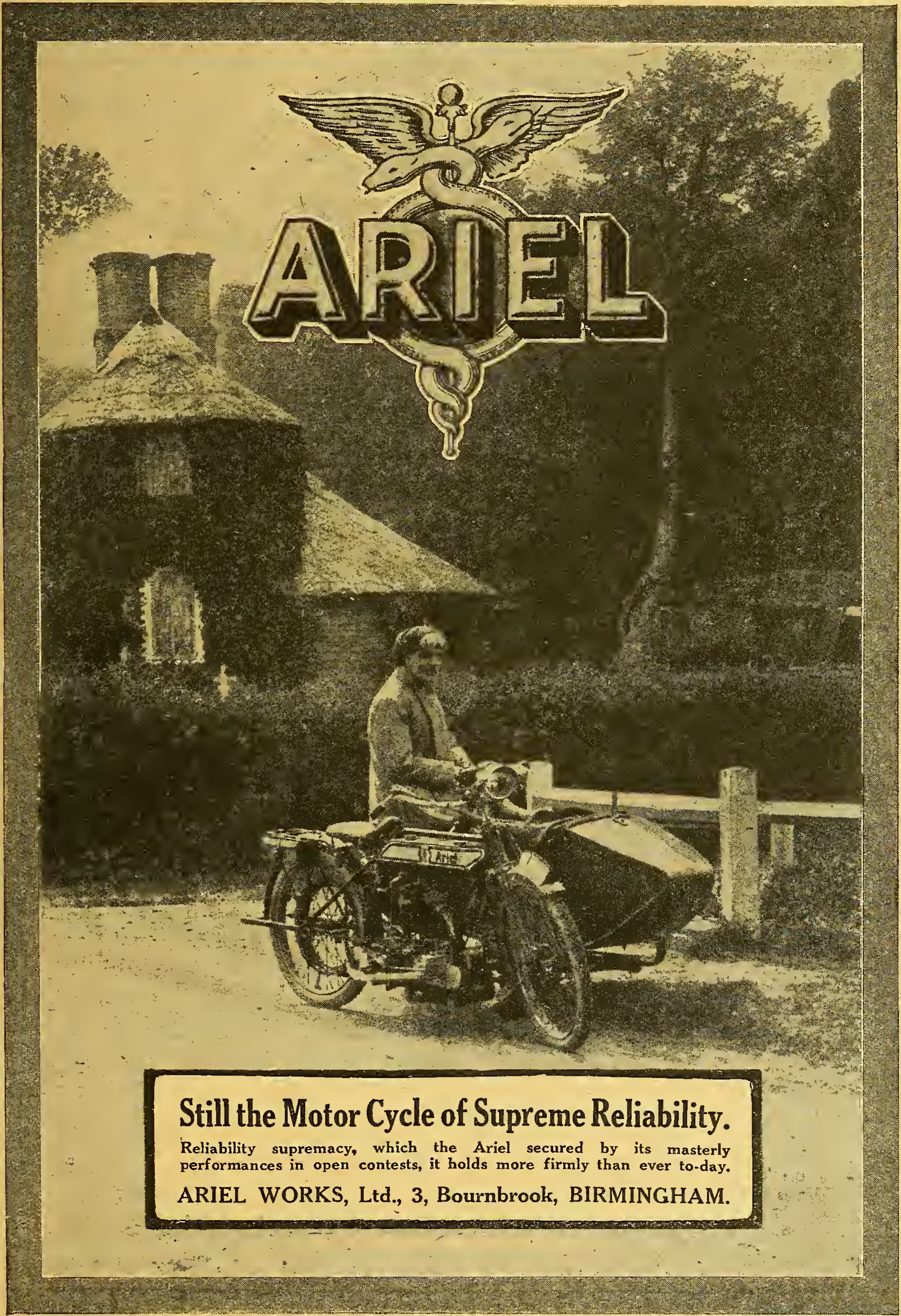
American Liberty Loan.

The Liberty Loan campaign, of which Mr. Walter Davidson (president of the Harley-Davidson Motor Co.) was one of the committee, has proved an unprecedented success. The quota allowed to Milwaukee was £5,000,000 as a maximum, but over £6,000,000 was subscribed, well over 30% over the maximum allowed for that district.

These figures, taken in conjunction with the success just obtained in the recent Liberty Loan, speak well for Milwaukee's enthusiasm.

Electricity instead of Petrol.

Cable advices from New York show that President Wilson is taking personal interest in steps to bring about petrol economy without undue disturbance of transport interest. He has agreed that every encouragement shall be given to the continued output of electric lorries both for home trade and export to the United Kingdom. The U.S.A. Aeronautical Department has purchased the rotary engine division of the Long Island City Factory of the General Vehicle Co. for £500,000, but the terms of the Government contract expressly protect the electric vehicle departments, and every facility will be provided for their increased production if required. It is understood that the present depletion of transport in the United Kingdom largely accounts for the decision not to interfere with the General Vehicle Co.'s export trade.



Still the Motor Cycle of Supreme Reliability.

Reliability supremacy, which the Ariel secured by its masterly performances in open contests, it holds more firmly than ever to-day.

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M.C. 509.

British Magnetos.

It is announced that up to the end of the year 1917 the members of the British Ignition Apparatus Association had manufactured and supplied over 300,000 British magnetos.

Altitude Record.

Flight-Lt. F. B. Papa, of the Italian Army, on a Sia-Fiat biplane, has beaten his own previous height record when carrying a passenger by nearly 2,000 feet, attaining a height of over 23,000 feet (4½ miles). The engine fitted to the biplane was the same type of Fiat as the one used for the Turin to London flight.

New Petroleum Supply.

Eight hundred and fifty-nine new oil wells have been started near Los Angeles, California, in an oilfield estimated to cover two thousand acres. From one well alone oil is flowing at the rate of seven thousand barrels a day. The exportation of oil from the United States now reaches eight million to nine million barrels a year, which is three million to four million barrels in excess of the 1915 figures.

Petrol for Wounded Soldiers.

It is generally understood that wounded and convalescent Service men who are also the registered owners of motors shall be granted pretrol licences, and also permits to use their vehicles whether cars or cycles. A wounded officer in that home of culture and enlightenment—the North—has recently had a case against him dismissed on payment of costs as a great favour by a bench of magistrates of usual intelligence and with all prejudices complete.

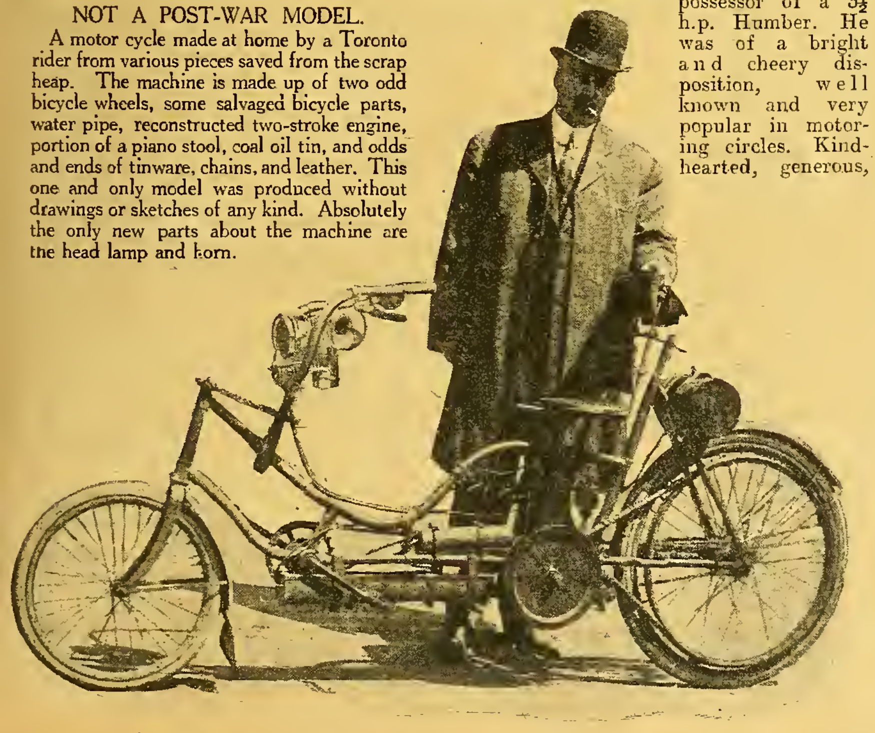
As a matter of fact, although the granting of a petrol licence to a wounded soldier is quite legitimate, the unfortunate applicant cannot always be sure of success. A member of our staff in this position has had some almost humorous replies to various applications made on these grounds, but they have all been of a consistently negative nature.

Anonymous Contributions.

We have often called attention in these pages to the necessity of correspondents sending their names and addresses, not necessarily for publication, but for the benefit of the writer of the letter. Here is a glaring instance. A wounded officer applied to the Petrol Controller's Department for a licence. The Petrol Department held up his application, and did not grant the permit until an interval of six weeks had elapsed. As our correspondent only signs himself "Wounded Officer," we must refrain from publishing his letter, and are also prevented from taking up the matter with the Petrol Controller's Department. If, however, "Wounded Officer" will send us his name and address, we will gladly take up the matter with the Department, with the idea of preventing others from being treated in like manner.

The Late Mr. H. J. Swindley.

We greatly regret to have to announce the death of Mr. Harry J. Swindley, so long connected with our parent journal *The Autocar*. He joined Messrs. Iliffe and Sons Ltd. about thirty years ago, and was an enthusiastic cyclist, holding the position of London Editor of *The Cyclist* for a great many years. When the motor cycle came into prominence, and before this journal was started, *The Cyclist* devoted a certain amount of its pages to the self-propelled bicycle, and the late Mr. Swindley used then to contribute the motor cycle notes. His best love was always the pedal cycle, though for a short period he was the possessor of a 3½ h.p. Humber. He was of a bright and cheery disposition, well known and very popular in motoring circles. Kind-hearted, generous, and a true sportsman, he will be sadly missed by all who knew him. He was a born journalist, a brilliant writer, and a hard worker, and the more work he had to do the more cheery he became. His active work with our parent journal *The Autocar* ceased in the spring of 1915, after which time Mr. Swindley suffered from a sad and long illness, which terminated in his death on the 14th inst.



NOT A POST-WAR MODEL.

A motor cycle made at home by a Toronto rider from various pieces saved from the scrap heap. The machine is made up of two odd bicycle wheels, some salvaged bicycle parts, water pipe, reconstructed two-stroke engine, portion of a piano stool, coal oil tin, and odds and ends of tinware, chains, and leather. This one and only model was produced without drawings or sketches of any kind. Absolutely the only new parts about the machine are the head lamp and horn.

Petrol Economy in U.S.A.

In order to bring about petrol economy without disturbing transport interests, the U.S. Government has agreed to encourage the manufacture of electric lorries for use in America, and for export to this country.

A Severe Blow.

It has recently been announced that the Government has decided not to proceed further with the Petroleum (Production) Bill.

The Exploitation of Home Fuel Supplies.

This announcement is certainly perturbing to the motorist, but it has since been explained away. The Bill has been dropped so that the King might issue an Order in Council to the same effect.

The Order in Council is, of course, much more easily and rapidly brought into being, and the Government has just discovered that new legislation, as such, is unnecessary.

Potatoes for Alcohol.

Most of our readers will be aware that for many years we have had frequent discussions in our columns on the use of alcohol as a petrol substitute, and on the possibilities of producing alcohol from home sources. This latter matter has now reached Parliament at last, and Mr. Clynes said something in answer to a question which could mean that the Government were keenly interested in the production of alcohol from potatoes or that they were simply pretending to show interest to save themselves from further agitation and bother.

Putting the most charitable interpretation on this excellent specimen of spoken official jargon, it meant that the Government were considering the advisability of experimenting on potatoes unfit for human consumption! Truly a mighty and difficult question for a Government official or department to have to tackle, though the ordinary man might be so lacking in acumen that the question would appear comparatively easy of answer.

Alcohol as Fuel.

This fuel question is one that ought by now to have been recognised as having passed joking limits, and it is sad to find that this is not the case. Alcohol can be made from potatoes, unfit for human consumption, at about 3d. per gallon, and it can be used as an excellent fuel in a suitably-designed engine.

But it is prohibitive in its cost on account of Excise restrictions—no maker can be expected to turn his attention to an engine that will use a fuel already taxed something like 1,000% *ad valorem*, and this without being recognised as a motor fuel!

The time will come when alcohol will be widely used, so why cannot we get on with the preparations now?

AMERICAN AND BRITISH MACHINES.

A Candid Opinion, not Altogether Favourable to American Methods.

THERE are one or two points on which the popular type of American machine scores over the British, but there are many on which it loses. The American has still a long way to go ere it is anywhere near the Britisher for accessibility. To give a single instance—two machines recently adorned my garage, one a 3½ h.p. British-made flat twin, and the other a 40° Yank. To remove the magneto from the flat twin merely necessitated loosening off two nuts, when the magneto slid clean out, together with its one-way dog, but to remove the magneto from the American is a matter of two good hours' fiddling and knuckle barking, removing of exhaust pipes and wangling of engine plates, while restoring it is on a par with the work of taming an African hyena.

To take a further example, the removal of the pilot jet on my present American twin necessitates removing the whole carburetter unit, complete with the induction pipes, as the pilot is inaccessible till this is done.

Engine Vibration.

The Americans certainly have beaten us on what might wrongly be described as sweet running, *i.e.*, an engine which ticks along with a minimum of fuss. The tappet mechanism and valves are lighter than in most British twins, a good deal quieter in operation, and the silencing is uniformly good. But it is merely the quiet valve mechanism and the good silencing which conveys that impression of sweetness. One or two American engines are well balanced, but others possess a most appalling period, and, taking all with all, the British twins are better balanced.

Probably the only reason why there are riders who praise the Yank at the expense of the British is because the Americans produce a type of machine which has no exact counterpart over here, *i.e.*, the high-powered chain-driven twin, light enough to use as a solo mount. The man who fancies a light and powerful solo twin really cut out for solo work has practically no alternative but to buy the Yank, and since it gives him perfect satisfaction he sings its praises. And the more narrow his experience the louder he sings, resorting, probably, to comparisons founded on paper "experience."

Detail Finish.

On American machines there are fittings and fittings, many of which would not be tolerated for one moment from a British factory. Their motor cycle brakes are certainly superior to their car brakes, and generally work well, though it is a marvel to me how the detail parts of many American machines ever hold together. Very often the detail finish is too appalling for words, the brake parts particularly being reminiscent of a village smithy, yet somehow they seem to hold together till permanently rusted on the frame.

I have no quarrel whatever with the twist grip, except that I regard it as an incentive to bad driving, for one does not obtain that nicety of adjustment given by handle-bar levers. In traffic, for instance, when ticking along on the pilot, one's natural impulse on seeing an opening is to give the twist grip half a turn, thus banging the throttle open to an extent one would not dream of with handle-bar controls. The twist grip throttle control has three positions in ordinary use—pilot, half throttle, and full throttle—no other stages being recognised by the rider, so that his petrol consumption is generally high. The twist grip for the exhaust valve and ignition is excellent, for here no particular delicacy is required.

Multitudinous Small Parts.

The design of many American machines is excellent, but the details——! For instance, one is led to wonder whether one highly-paid individual is appointed to supervise the distribution of split pins. There are approximately sixty split pins holding together the more or less vital parts of my present American, and I should not like to think that the distribution of these minute, spiky, yet vital units had been undertaken by any but a trustworthy and conscientious mechanic. Of course, their occasional use is advisable, but though the split pin makes a very simple way of fastening, one cannot help but regard its wholesale use as savouring of agricultural machinery and lawn mower practice.

One appreciates the little points of thoughtfulness and convenience in American machines, but in the opinion of one rider, at any rate, the average Yank is nowhere in the same street as the average Britisher as an engineering job.

I am not attacking American systems for the fun of the thing or with any ill-feeling towards them, but simply because many unfair comparisons have been made by people who have not sufficient knowledge of both products to express an accurate view. I consider that such machines as the Harley-Davidson, Henderson, Indian, and one or two others are beautiful mounts—far ahead of us on many points, but equally behind us in others. What appals me most on one or two American makes is the way the frames are drilled at the very weakest and most vital points, and with an apparent lack of thoughtfulness. Often holes are drilled in the *bends* of the chain stays or rear forks to take some trivial fitting, such as a chain-guard lug or a carrier stay, and thus the whole strength of the rear structure is jeopardised. It is surprising that designers who exhibit such care and forethought in many directions should fall short of what practically amounts to commonsense in such details as this.

CHINOOK.

THE DOUGLAS FOR 1918.

New Models of a Machine Very Popular both in Military and Civil Circles.

Practically no Striking Innovations are made, but there are Several Small Refinements and Improvements.

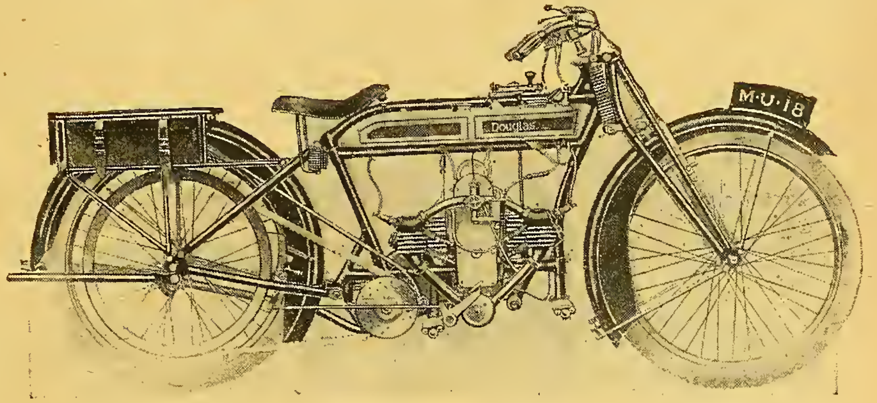
ALL motor cyclists know how well the Douglas has served the country during the present crisis, and after the war there is no doubt that when it is again available to the general public it will be found to have been vastly improved. The following are some details of the 1918 models:

That most popular model, the 2¾ h.p., which brought the house of Douglas into such high repute, is the leading line, and is being made in two types—models W and V. The 1918 model W, is to be equipped with a three-speed gear, handle-bar-controlled clutch, kick starter, footboards, and Tourist handle-bars, and is marketed at £65, including the 20% war advance. The Tourist type handle-bars fitted are much lower than the usual pattern, but, being in comparison with the saddle, much higher than previously, the former amount of comfort is retained, and the rider has an additional amount of controllability over the machine. These handle-bars are fitted to both models W and V, which are the only two diamond frame 2¾ h.p. Douglas machines listed for the present year.

The new Douglas spring forks. The links are now in one piece with the spindles, and means of adjustment for taking up wear are provided. Note also the ample mudguard clearance.

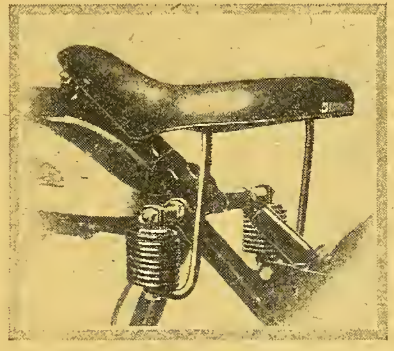
The V type is the popular T.T. model, and is now fitted with footrests, a three-speed gear box without clutch, and an adjustable pulley. It is sold at £55, including the 20% war advance.

A commendable feature is that adjustable pulleys are fitted as a standard to all 1918 models.



The 1918 Model V Douglas. There are no startling innovations or departures from previous designs, but the fitting of a hot air jacket for the carburetter is an interesting feature. The pipe conducting the heat from the front exhaust pipe is clearly shown in the above illustration.

The frames are now constructed in such a manner that the post-war rear springing may be attached at any time.



The new Douglas saddle arrangement used on both the 2¾ h.p. models (W and V). A low saddle position is obtained in combination with a normal driving position and semi-T.T. handle-bars.

Mention has been made above of the new saddle position. The saddle is a Lycett la Grande, the peak of which is pivoted directly on to the top tube, while the springs are anchored to an extension of the usual seat lug bolt.

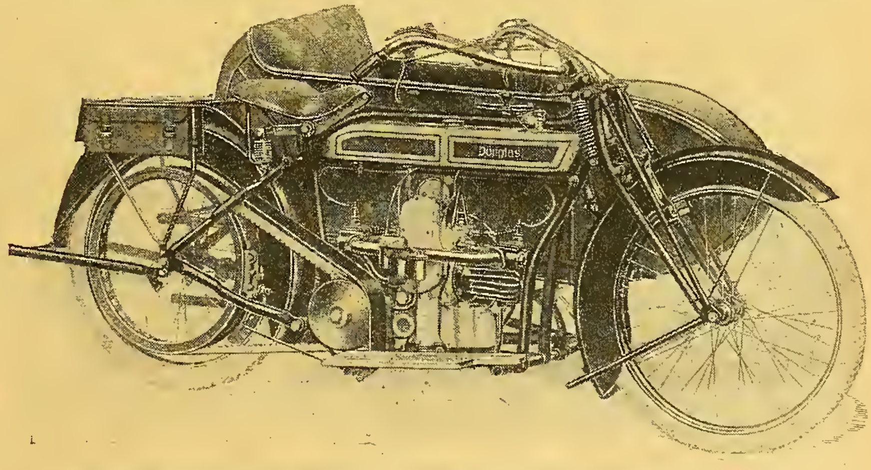
As regards the engine, the usual swivel type of exhaust pipe has been replaced by pipes giving a better clearance and leading directly into the silencer expansion chamber, so that the exhaust gases from one cylinder do not impede those from the other.

Warming the Carburetter.

The new tank is of exceptionally pleasing appearance, tapering as it does towards the rear, and having rounded edges. The excellent metal protected toolbag of large capacity, which met with our approval when we last inspected the W.D. model at the company's works, has been retained.

It is interesting to note that the carburetter warming jacket is connected to the front exhaust pipe, which, being freer from oil than the rear exhaust pipe, does not tend to choke the jacket with soot. Wide mudguards with ample clearances and chain and belt guards are fitted to all models. Dust covers of pressed steel are fitted to the adjustable tappets to prevent dust and grit from entering the guides.

The model X machine, which is listed at £65, is intended for ladies. It is now fitted with a handle-bar controlled clutch,



The 1918 Douglas 4 h.p. combination. This has undergone practically no change, and is available against a Ministry of Munitions certificate.

Douglas Machines for 1918.—

three-speed gear box, and kick starter, and is similarly equipped to the models we have previously described.

A great improvement has been made in the design of the 1918 front forks, which are now provided with links in one piece with the spindles, and are supplied with a means of adjustment for taking up side play or wear. The wide mudguard clearance can be clearly seen in the photograph. Large grease cups are provided to all fork bearings. This type of fork is standard to all the machines.

The 4 h.p. model A, which is provided with a three-speed gear box but no clutch or kick-starter, though it has an adjustable pulley, T.T. handle-bars, and footrests, has undergone no alterations except the fitting of round front down tubes instead of the D section. This type is listed at £70.

The Sidecar Machine.

The model B 4 h.p. Douglas is the sidecar machine sold at £92 10s. This also has undergone practically no alteration from the previous model. It is fitted with mechanical oiling, Amac carburetter (though a Douglas is shown in the illustration), three speed gear box, foot-controlled clutch, adjustable pulley, and footboards. The coachbuilt sidecar is finished in green and upholstered in red. This model can be delivered immediately to farmers, munition workers, doctors, and those concerned in the supply of food, on obtaining a priority certificate from the Ministry of Munitions. As those motor cyclists who can obtain priority certificates will doubtless be in a position to obtain petrol also, we should imagine that many will be glad these models are available.

* * *

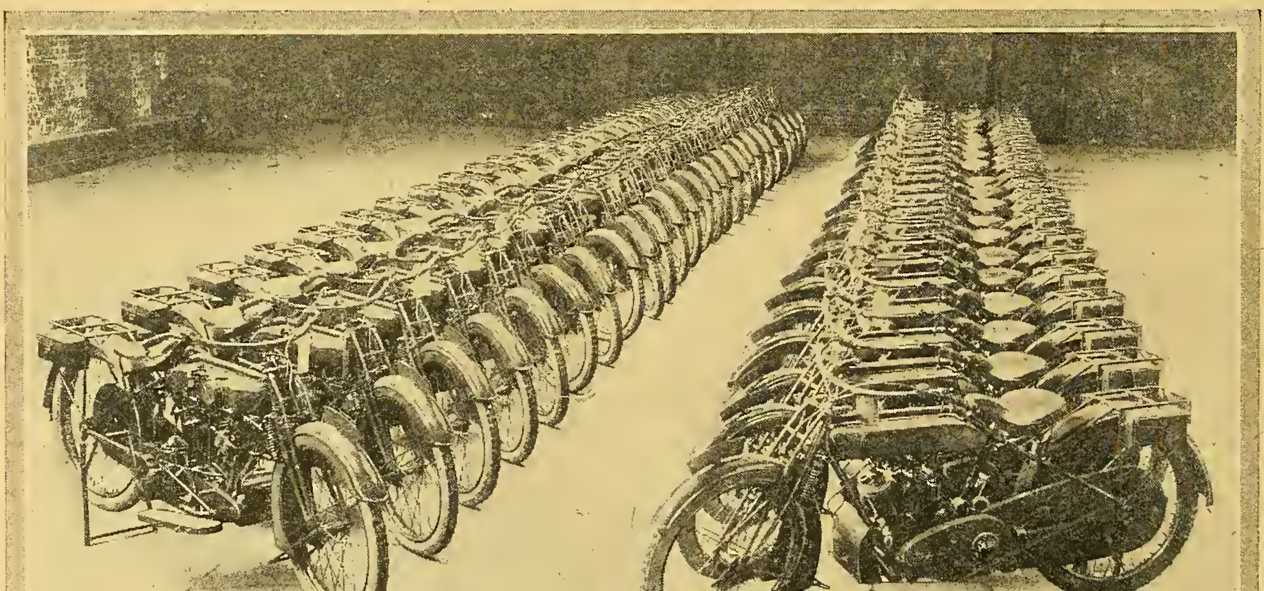
HELPING U.S.A. ARMY MOTOR CYCLISTS.

How American Commercial Methods are being introduced into the Army.

As an example of what American manufacturers are doing to render the use of the motor cycle entirely satisfactory in the United States Army, we are able to quote a few facts gleaned from information received from Mr. Walter Davidson, of the Harley-Davidson Motor Co. In the United States the company has fifteen or sixteen men belonging to the factory visiting the various cantonments, and doing nothing but setting up the machines and then instructing the riders how to handle them. These cantonments are practically new cities built up in various parts of the country, and, of course, with no facilities for repairing the various motor cycles which are in use in them, so the Harley-Davidson men had a big job in front of them. The company has now one of its own men, a very good organiser, going from camp to camp, and taking up with the various commanders the question of organising repair corps inside the camps, and also giving all possible incidental assistance.

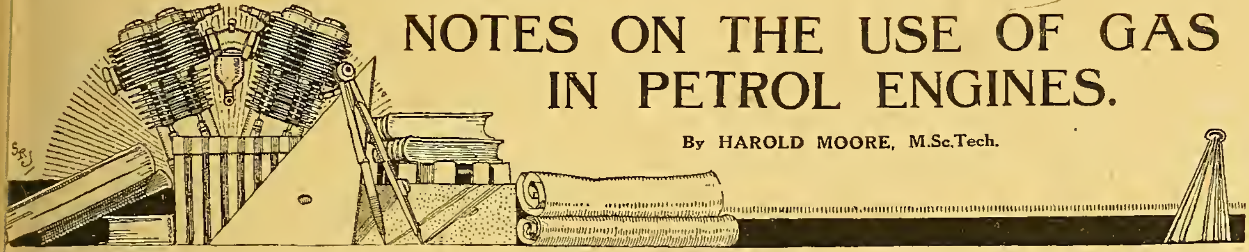
Mr. Walter Davidson writes: "I am sure that when we get through with this work the Army will have reduced the repairing of motor cycles to a science, and the result will be that, instead of having a number of broken-up and 'joy-ridden' motor cycles to damage the reputation of this type of vehicle, they will have highly efficient mechanics taking care of these machines, so that they may give 100% efficiency. The motor cycle is gradually being recognised in the United States Army as a very essential instrument of warfare, and it is our duty to hasten its recognition as fast as possible.

"The United States Army intend to carry a supply of spare parts equivalent to a typical factory stock, and they intend to carry a stock at each one of the cantonments in the U.S.A. You can readily appreciate that this has been an immense task, as the Army had made no provision for taking care of the machines they had bought. When I tell you that they are taking over seventy-five of the very best motor cycle repair men that we can find for service in the base repair shops in France, you will realise that they are going after it with the proper spirit. These repair shops are going to be immense institutions employing thousands of men, and equipped with every kind of machinery imaginable. We here in the factory are going to supply the necessary parts to take care of the machines, and are also working on all the repair tools which they will need to salvage the motor cycle in every respect."



ROVER MOTOR CYCLES FOR THE AMERICAN ARMY.

A consignment of military model Rover motor bicycles recently supplied for the use of the American Army in France. The machines are the latest model 5-6 h.p. Rover, fitted with J.A.P. engine, 28in. × 3in. Dunlop tyres, all-chain driven, with both chains enclosed, and a three-speed countershaft gear. One of the chief points of interest in the design is that the crank cases have a 6½in. clearance. The Government has given the New Rover Cycle Company permission to dispose of a few of these machines for private use.



NOTES ON THE USE OF GAS IN PETROL ENGINES.

By HAROLD MOORE, M.Sc.Tech.

The following article provides a *résumé* of most of our available knowledge on the use of coal gas, and also briefly indicates one or two points in its use as a motor fuel that should be new to most of our readers. The author of the present article supplied most of the information published in the article on "Spontaneous Ignition," by P. J. M., in our issue of December 13th, 1917. The problems involved in carrying the gas have been purposely overlooked, as they have been dealt with so fully in several of our recent issues.

THE use of gas in petrol engines has come as something in the nature of a surprise to the motoring public, and as a testimony to the ruth of the old adage concerning the relationship between necessity and invention. As a temporary substitute for petrol, gas has already taken a prominent position, and the writer does not propose to deal with its use as a temporary fuel, but to consider its possibilities as a permanent substitute for the liquid fuels hitherto used in petrol engines.

The points that have to be taken into consideration when valuing the respective merits of gas and petrol may be classified under three headings:

(1.) Price, quantity, and quality of gases available.

(2.) Mechanical problems regarding storage, charging of containers, design of carburetter, etc.

(3.) The scientific problems encountered in burning gas mixtures.

We will examine in turn the more important factors which can be placed in these three main categories.

Price, Available Supplies, and Qualities of Gas.

It is necessary to take into consideration the price of our ordinary motor spirits in order to make a comparison of the economy of their use and that of the use of gaseous fuels. The present prices of petrol cannot be considered as in any way a measure of post-war prices. War requirements and shortage of transport facilities have increased the demand whilst diminishing the supply. High insurance premiums have also contributed to raise the prices. Pre-war prices of petrol and shale spirit may be taken as 1s. to 1s. 6d. per gallon retail, with approximately the same prices for benzole, whilst heavier substitute fuels could be bought at 6d. to 1s. per gallon. After the war, when normal conditions are approximately restored, we may expect the following influences to affect the price of motor spirit. There will be an increased consumption on account of the natural increase in motor traffic, and a new demand for aircraft used for purposes of business and pleasure, while probably there will be a decreased Government demand. It is, however, certain that the total requirements will be greater than ever before. The supply of petrol will be vastly increased, this increase being due to three main causes: Firstly, the enormous amount of spirit produced from heavy petroleum oils by the new "cracking" processes; secondly, the increase in the supply of benzole brought about during the war by Government regulations, and largely due to the "stripping" of benzole from coal gas, a process which has been made possible by relaxations in the standard requirements in illuminating power of coal gas supplied in towns; and, thirdly, because the war time experiences in running on heavy fuels will have brought many products within the range of motor users which before the war were considered unsuitable for use in petrol engines. To estimate the effect of these conflicting influences, together with many minor factors, is too complex a problem to allow of direct calculation, but the writer holds the opinion that the price of motor spirit (disregarding the influence of competition from gaseous fuels) is not likely to be much higher than in pre-war days. [We hope this optimistic opinion will prove to be correct, but we have our doubts.—ED.]

The price of gaseous fuel must first be reduced to a basis such as to allow of a direct comparison of price with liquid motor spirits.

Several authorities have stated that 250 cubic feet of coal gas will propel a motor vehicle the same distance as one gallon of petrol, a value which is in sufficiently close accordance with results obtained by purely theoretical calculation.

Comparative Prices of Gas and Petrol.

Coal gas from towns' supplies costs 2s. to 4s. per 1,000 cubic feet when bought for domestic purposes, and in many towns a large profit is made by selling it at these prices. A large part of the cost of gas is due to the upkeep and capital charges on the distribution and meter system outside the gas works. If supplied at pre-war rates charged for industrial purposes the price should be about 2s. per thousand cubic feet, which is equivalent to petrol at 6½d. per gallon.

Gaseous fuel is obtainable from other sources than gasworks plants. It is produced in enormous quantities as a by-product from coke ovens and blast furnaces, and can be prepared in water gas plants, gas producers, and oil gas plants. The gas obtained from water gas plants, producers, and blast furnaces is considerably lower in heat value than coal gas, and the use of such gas would greatly decrease the mileage obtainable on a motor vehicle from a container of any given capacity. This would probably exclude these gases from use as motor fuels. As oil gas is prepared from heavy petroleum oil its cost is dependent upon the price of petroleum (a very variable figure). Coke oven gas is obtained as a by-product in the preparation

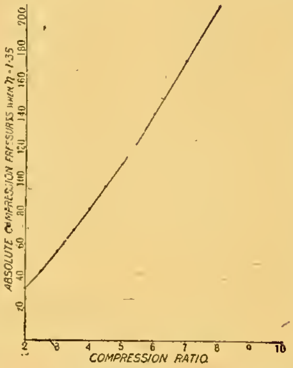
Notes on the Use of Gas in Petrol Engines.—

of the coke used for metallurgical purposes. The price of coke oven gas depends largely on the locality of the coke ovens. It has generally about the same heat value as gasworks gas, and is available at a much lower price than the latter product. It should be obtainable for motor purposes at a price below 1s. per thousand cubic feet, equivalent to petrol at 3d. per gallon.

From the foregoing it is evident that gas is much cheaper than petrol can possibly be, and that there is no doubt that, after the war, even if the taxes on petrol were abolished, gas would still be the cheaper fuel.

Many substitutes for petrol have been found in the past, but hitherto it has always been the case that as soon as a substitute came into use in quantity it rose in price until there was little or no advantage in using it. This phenomenon, of course, is due to the comparatively small amounts of substitute which have been available. It therefore presents itself as a question whether the use of gas in petrol engines will reduce the price of petrol or increase the price of gas. If sufficient gas can be prepared to cope with normal demands, and at the same time to supply the motor fuel market, it will not rise seriously in price.

The production of gasworks gas in the United Kingdom is about 200,000,000,000 cubic feet per annum, whilst the quantity of gas generated in coke ovens cannot be much short of this figure. A considerable proportion of the coke oven gas is, however, used for heating the coking chambers, and would therefore have to be deducted in order to find the quantity available. The motor spirit imported into this country during 1914 was approximately 120,000,000 gallons, which, together with shale spirit and benzole, would make roughly 150,000,000 gallons of spirit available for motor use. This is equivalent to about 30,000,000,000 cubic feet of gas, or 15% of our coal gas output. The production of this extra quantity of gas would undoubtedly necessitate an increase of plant, but it would be in no respects impossible to produce the extra amount, and thus completely supply the motor market.



ATMOSPHERIC PRESSURE P_a = 12·5 LBS. SQ. IN n = 1·35	ε =	2·0	2·5	3·0	3·5	4·0	4·5	5·0	6·0	7·0	8·0
	p_c =	31·9	43·0	55·1	67·8	81·2	95·2	109·5	140·5	162·4	206·5

The absolute compression pressures produced by various compression ratios.

The Question of Enriching Coal Gas with Acetylene.

It has been suggested that the addition of acetylene to coal gas would increase its heat value. At the present time there would be the greatest difficulty in obtaining either acetylene or calcium carbide in large quantities, and even if prices were to fall to pre-war standards acetylene would still be too expensive for use as a motor fuel. It may also be remarked that it possesses a lower temperature of spontaneous ignition than coal gas, and would therefore reduce the maximum compression permissible. The comparatively high carbon and low hydrogen content of acetylene, together with its chemical structure, creates a danger of the deposition of carbon inside the engine if large percentages of this substance be employed. The heat value of acetylene is much greater per unit of volume than that of coal gas, one cubic foot yielding 1,500 B.Th.U. net: a similar amount of coal gas yielding only 500 B.Th.U. Thus gas could be available in sufficient quantity to replace petrol, and at about one-tenth the present price of this fuel.

The Scientific Problems encountered in using Gas as a Motor Fuel.

When a fuel mixture is compressed in an engine it becomes heated, the temperature obtained at various pressures being shown below:

Gauge pressure.	Temperature.
0 lb.	30° C. (assumed temperature of charge on entering cylinder)
15 lb.	103° C.
30 lb.	133° C.
45 lb.	162° C.
60 lb.	186° C.
75 lb.	207° C.
105 lb.	242° C.
135 lb.	271° C.

Now if petrol be heated to 270° C. in an enclosed vessel under conditions approaching as closely to those of an engine cylinder as are obtainable under laboratory conditions, it is found that at that temperature the petrol will ignite spontaneously (without any spark). Therefore if our compression be over 135 lb. per square inch it will cause the charge to ignite before the occurrence of the spark, and "pre-ignition" or early firing will take place even when the engine is cool. With a hot engine with highly heated exhaust valve head and sparking plug points this pre-ignition would take place at a much lower pressure than 135 lb. per square inch; in fact, we find that about 90 lb. per square inch is as high a pressure as is practicable on an engine required for general use. Though this applies to petrol it does not follow that such a compression should be the limit for ordinary use on other fuels, the compression pressure allowable being dependent on the spontaneous ignition temperature of the fuel. The writer published the results of the experimental determination of the ignition points of several liquid fuels in *The Motor Cycle* of December 13th.

It will be observed that petrols ignite at about 270° C. Paraffin oil is considerably lower in ignition point, which accounts for the knock and overheating (both due to pre-ignition) that are frequently noticed when running high compression engines on this fuel. Motorists who have run on benzole will know that it does not readily pre-ignite.

The ignition point of coal gas is over 500° C., which means that the compression can be considerably raised without danger of pre-ignition. On gas engines running on coal gas compression pressures as high as 180 lb. to 200 lb. per square inch may be employed.

The thermal efficiency of an engine is dependent upon the compression ratio, and a great saving in fuel can be accomplished by raising compression wherever possible. The theoretical thermal efficiencies for

Notes on the Use of Gas in Petrol Engines.—various compression ratios are shown in the accompanying graph (see fig. 2). In practice efficiencies are considerably below theory, and we find that a compression of 70 lb. (on a high speed engine) yields about 20% efficiency, 120 lb. yields about 28%, and 200 lb. per square inch yields over 32% thermal efficiency. If the compression of an engine be raised (by lengthening the connecting rod or piston head) it will not run satisfactorily, however, on fuel of low ignition point, therefore before raising compressions we must decide whether we wish to run on gas at all times.

Increased compression also greatly increases the power output of the engine, and if raised compressions were adopted for running on gas the complaint of decrease of available power would be remedied. From the foregoing it is evident that the results obtainable from gas can be greatly increased by raising the compression of the engine if it is not required to use the engine on other fuels. The increase in both power and efficiency would be in the neighbourhood of 25%, and would increase the mileage obtainable from a container of any given capacity by a corresponding amount.

The effect of the gas upon the lubrication system would not be so deleterious as that of liquid fuels, as there is no possibility of gas becoming dissolved in the lubricating oil, as is the case with ordinary motor spirits, and the deposition of carbon in the cylinder is not so likely to occur with gaseous as with liquid fuels. The "petroil" system of lubrication for two-stroke engines would have to be abandoned, of course.

The "flexibility" of an internal combustion engine is largely dependent upon the explosive range of the fuel. The mixture of petrol vapour and air at ordinary pressure is not explosive (according to Eitner) unless the content of petrol vapour is at least 2.4% (by volume), and not if it be in excess of 4.9%. These limits do not directly apply to internal combustion engines, as the charge in an engine is under pressure at the time of firing; they, however, form a rough measure of the probability of engine stoppage due to the mixture becoming either too weak or too rich to explode. With coal gas the explosive range, according to the same authority, is 7.9% to 19.1%, a considerably wider variation of mixture being permissible than when burning petrol. Thus coal gas, if the running be properly controlled, should prove a much more flexible fuel than petrol.

In conclusion, the possibility that gas may become a really serious rival to petrol depends upon many factors, the more important of which we will briefly summarise:

(1.) Coal gas can be prepared in the United Kingdom in sufficient quantity for all present motor purposes by increasing the number or size of carbonising plants in the country.

(2.) The price of gas will make it a much cheaper fuel than petrol is ever likely to be.

(3.) The storage of gas at atmospheric pressure is satisfactory for short distance travelling.

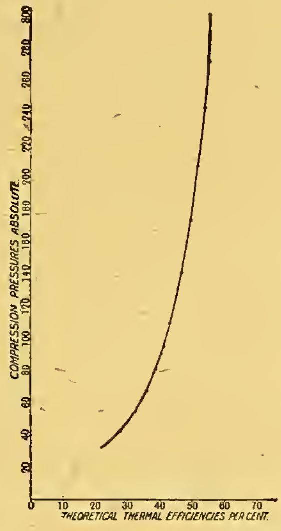
(4.) High pressure systems will require compressors, and will therefore be more expensive. They are more convenient; adequate for longer journeys, but require experimental work before they can be suitable for general adoption.

(5.) Dissolving coal gas in some other body, in order to lessen the necessary volume of the container, presents serious difficulties, but might be done after the necessary research work.

(6.) Gas, if passed through a suitable carburetter, should start an engine very easily.

(7.) If gas be used in special engines with raised compression, much higher thermal efficiency and better mileage will be available.

(8.) Gas is a much more "flexible" fuel than petrol.



$n = 1.35$

THERMAL EFF.	21·6	27·4	31·[illegible]	35·5	38·4	40·9	43·1	46·6	49·4	51·7	53·7	55·3
COMP PRESSURE	31·9	43·0	55·1	67·8	81·2	95·2	109·5	140·5	173·0	206·5	242·2	300·0

Thermal efficiency and its relation to compression pressure (see graph).

* * *

GASOLINE AND GAS IN AMERICA.

We have several times in these pages chaffed our American cousins for calling petrol "gasoline" for short. Gasoline is obviously much too long a word in the land of abbreviations, so they usually speak of it as "gas," with what confusion can be judged from the paragraph given below, which was taken from an American journal:

"Whether gasoline is gas or 'gas' is to be decided in the courts of Pennsylvania, and may from there go to the United States Supreme Court. According to the United Natural Gas Co., gasoline is gas, and when it is removed from natural gas, to make it 'gas,' the removal deprives the buyer of the natural gas of gas that he has ordered and will in due time pay for. The Alum Rock Gas Co., of Franklin, Pa., which has been selling 'gas'-less gas to the United Co., says that gasoline is 'gas,' not gas, and that it does not intend to furnish both gas and 'gas' when its contract calls for only gas. Since the suit concerns the ownership of the 'gas' in gas, and is the first of its kind, it will be pushed to a complete adjudication."

Now we know all about it.

The Autocar says: "We shall not be surprised to see the Board of Trade come out with an announcement in the near future that until further notice no motor spirit imported from Overseas shall be disposed of to the public at a higher price than a figure to be mentioned in the announcement."

MILITARY NOTES

TYPE OF MAN FOR FLYING: ONE OF THE "ORIGINALS."

PROMOTION OF BREVET-COL. E. D. SWINTON.

BREVET-COL. E. D. SWINTON, C.B., D.S.O., R.E., is to be promoted temporary major-general while engaged on special work. In 1911 Gen. Swinton, then major, was one of the observers on a German car during the Prince Henry Tour. He was also partly responsible for the introduction of the Tanks. Gen. Swinton is the author from whose pen emanated "The Green Curve," a book which caused a sensation prior to and during the beginning of the war.

* * *

M.T. IN THE FIGHTING ZONE.

A COLONEL in the Gunners, who is a keen motor cyclist, writes: "I have been amused at a letter regarding the risks run (or said not to be run) by the A.S.C., M.T., men. As a matter of solid fact, they do have a jolly rotten time of it. Very often they have to carry out extremely dangerous jobs in cold blood. They are thoroughly deserving of all the praise they may get, and they often do not get half enough of it for what they have to go through." Referring to the letters on the subject, the colonel states:—"Some of them are certainly the effusions of people who do not frequent the region of the front line."

LADY MOTOR CYCLIST TRANSFERRED.

Miss Mary Reid, of Aberdeen, a pioneer Scottish lady rider, who joined the R.F.C. as a despatch rider, is now in France. She has been transferred to the W.A.A.C., and is at present driving a "Prince Henry" Vauxhall. Miss Reid drove a Brough in the last Scottish six days' trials.

MR. LLOYD GEORGE ON THE AIR SERVICE.

MR. LLOYD GEORGE, in the course of a recent speech, remarked that the operations of the Air Service will probably have greater effect in determining that this must be the last war than any other weapons.

Sir Frederick Smith, in proposing the health and prosperity of the Air Service, said that it might well be that in the next twelve months the future of the war would be determined by the conquest of the air. That could only be if there were harmony and co-ordination among all those who were mastering the enemy in the air. If there were competition between the Army and Navy, and a third element of competition by some neutral, or hermaphrodite board, it was evident that there never could be success, and his appeal to them was that there should be no controversy between the Army and Navy.

* * *

TYPE OF MAN FOR FLYING.

CLARENCE WINCHESTER, author of "Flying Men and their Machines," writing in the *Daily Mail* recently, dwelt on the question of the type of man best suited for the making of an airman. He said: "There is no general rule as to the characteristics to be found in a good pilot, but I can safely say that to possess 'hands' is very important in actual flying.

"I have had very promising pupils deteriorate at the end of a course. I have seen slow-moving landsmen become quick-witted and alert airmen, and I have known men very quick on the ground to be too slow in the air—with the resultant crash! The ambition of one embryo pilot I knew was to become a church organist, and when he was not on the flying ground he was practising on the parish church organ. Another, before learning to fly, was a grocer's assistant; and this leads me to express the hope that in the new Air Force provision will be made for all ranks to learn to fly instead of confining this privilege almost exclusively to the officer class.

"There is one warning I would give to parents whose sons may be anxious to fly. If they intend their boys to remain in aeronautics professionally after the war, they should see that they are equipped with a knowledge of engineering and aeroplane design, for the mere ability to pilot aircraft will be so common that aviators will be cheap."

* * *

AIRMEN'S CONVALESCENT HOME.

A CONVALESCENT home for flying officers in the R.F.C., entitled the R.F.C. Auxiliary Hospital, Overseas Club Branch, has been opened near Croydon, at Shirley Park, which affords many facilities for outdoor recreation.

Every room or ward in the home will be named after some part of the British Empire, or some British community in a foreign country, which is contributing towards its upkeep.

* * *

ONE OF THE "ORIGINALS."

GNR. "BILLY" RENNISON, Tank Corps, who was severely wounded in the "Byng push" at Cambrai, is now in hospital at Etretat, France. Gnr. Rennison is one of the few remaining of the famous C Company of the Motor Machine Guns—those gallant lads who took the first Tanks into action in the autumn of 1916. He has taken part in every "push" in which the Tanks have figured, and still pins his faith to the old "'buses," for, now that he is wounded and out of action, he has sent home his savings to be invested in the Tank Bank. Prior to the war, he was a well-known North-country motor cyclist, and for some time acted as despatch rider at the Tank Headquarters.

Gunner "Billy" Rennison, Tank Corps.

LETTERS to the EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

REQUEST.

Sir,—May I appeal through your columns to your readers or the loan of a catalogue and illustrations of the Singer motor cycle, 1903 (?) model, with engine in wheel? The makers are quite out of all printed matter of this machine; hence my request. (Rev.) JOHN HODGKIN.

Whittington-in-Lonsdale, Carnforth.

ENGINE BALANCE.

Sir,—I would respectfully suggest to "Nortonian" that he should go carefully over his engine holding bolts, and see that they are all absolutely tight. Unless his engine has been in the hands of some of our war-time "motor engineers," and alterations from standard made, or the engine itself is loose in the frame, I cannot understand his trouble, as I know of no better balanced single-cylinder engine. At 60 m.p.h. the 79×100 engine is almost as effortless as the average flat twin. M.B.

Ystalyfera.

FRONT WHEEL BRAKES.

Sir,—I have often seen in your columns comments on "Useless Front Wheel Brakes." Why does some manufacturer not employ the internal expanding brake drum on the left side of the front wheel, and operate it by the usual Bowden wire? The wheel could still be detachable and interchangeable on the A.J.S. principle.

The dummy belt rim is all right for machines without detachable wheels, but when these are incorporated this type of brake is impracticable.

Although only sixteen and a half years old, I follow your interesting journal every week. I drove our 6 h.p. Ariel outfit from 1915 until the Petrol Restriction Order came in. F. R. ROYSTON.

TECHNICAL INACCURACY.

Sir,—In reference to the story by Angelina Simpkins, which appeared in your issue of December 20th last, and entitled "A Race with Ruin," may I say that the absurdity of several of her statements, undoubtedly, appealed to the commonsense of some readers, but they, like myself, took the article as a story, and saw the humorous side of it?

However, the statement made by Mrs. Simpkins that her conclusions were "based on complicated mathematical calculations" is so obviously a deviation from the truth that it should not be allowed to pass without comment.

The R.F.C. friend, of whom the lady speaks, does not show a perfect knowledge of motor cycles.

I sincerely hope that, if he ever becomes a pilot, he will not try to "oil the tyres" or "grind in the valves" whilst his engine is running. LLETTAC.

Rochdale.

Sir,—There are one or two letters in your issue of January 3rd which positively astonish me. I feel truly sorry for "Old Reader." All his sense of humour seems to have died out. Mrs. Angelina Simpkins is to be congratulated on having produced such an amusing story. "Old Reader" might try grinding in his valves at speed if he has got a hydrostatic turbine!

Such letters as those from Chas. S. Ives, F. Jones, and "R.O.W." are merely disgusting. If you begin to run short of readers some of us will have to take several copies per week.

I do not think anybody will deny that *the* weak point of the W D. Triumph is the design of the front fork, which causes front wheel slip. As regards power, I do not think there is much wrong with a motor bicycle that will climb Cassel Hill on top (I mean the hill coming into Cassel from the St Omer direction).

I hope no more pro-German readers will show their heads. Perhaps "R.O.W." does not *compris* that the Bosch magneto hindered our own magneto trade, because makers fitted it, and there was consequently no demand for British magnetos.

H. St. V. ADDENBROOKE, Sec.-Lt. R.E.

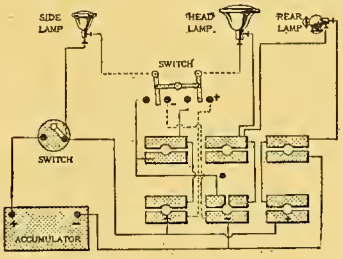
WIRING AN ACCUMULATOR LIGHTING SET.

Sir,—In reference to my solution of "Chinook's" accumulator wiring problem, I beg to draw your attention to an error that you have evidently made in printing. If you will refer to my diagram you will find that the wire connecting the head and tail lamps is earthed, and also the wire which is connected to terminal 2^1 of the switch.

By omitting the above the whole system is made unworkable. I shall be greatly obliged if you will call the attention of your readers to this in your next issue. C.E.S.

[We have looked up the original diagram sent us by "C.E.S.," and find that it coincides exactly with our artist's reproduction.—Ed.]

Sir,—In the many replies to "Chinook" *re* electric wiring I was somewhat surprised to notice that, apart from myself, none of your contributors allowed him to have his lamps in parallel should he desire to do so on very bad roads, etc. On the other hand, I arranged all my lights either in series or parallel, but should "Chinook" care to use my idea he can very easily use the head lamp in parallel and the other two in series by placing the plug top in the series plug and inserting a change-over switch in the head and side lamp wiring, and connecting according to the enclosed diagram, when by using only the change-over switch he can have either all lights in series or only the side and tail, or by placing the plug top in the lower plug he will have all lights in parallel. The change-over switches can be seen illustrated in any telephone list or are simple to make. C. A. COPINGER.



How the wiring may be arranged to give three different results.

EXHAUST POPPET VALVE DESIGN.

Sir,—Looked at with the eye of an ignorant amateur, all "Engro's" designs seem to have the objection that they expose a larger surface to the heat of the actual explosion than does the standard valve, consequently there would be great difficulty in lubricating the upper portion of the stems and guides. I very much doubt whether the hollow stem would counterbalance the larger amount of heat absorbed by the exposed stems. Nos. 4 and 5 have the further objection that the ends of the tappets are exposed to the hottest flow of escaping gases, and therefore would probably burr badly even if they were fitted with mushroom heads. The excrescence on the head of No 2 would be a grand source of pre-ignition unless very carefully designed, and it would make grinding-in a difficulty.

I think it is at least *optimistic* to talk of "cool" air being drawn through the valve. J. M. PHILPOTT.

CENTRIFUGAL FORCE.

Sir,—Your correspondent, "E.D.A." is right in controverting the theory of "Lieut. R.F.A." that centrifugal force acts tangentially; but his letter shows that he is not himself clear as to the meaning of this so-called force. The epithets "centripetal" and "contrifugal" must be allowed their proper meaning, otherwise the result will be only mental confusion. "E.D.A." has confounded the two. He calls that centrifugal (away from the centre) which is really centripetal (towards the centre) and *vice versâ.*

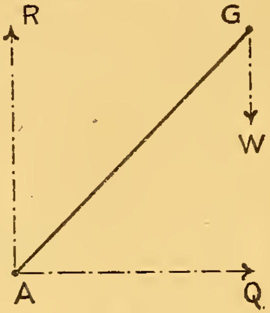


Fig. 1.

What is commonly called "centrifugal force" is not, strictly speaking, a *force* at all. It is, as "Lieut. R.F.A." rightly says, a fiction introduced to reduce a dynamical problem to a statical one.

To make the matter clear, we will treat the problem of a bicycle rounding a corner *ab initio.* It is a fundamental principle in dynamics that a body cannot change its state of rest or motion unless force be applied to it from outside. Thus, as Newton's first law of motion puts it: "A body if at rest remains at rest, and if in motion will move with uniform velocity in a straight line unless acted on by some impressed force."

Now, when a bicycle rounds a corner it is not moving in a straight line. Clearly then, there is some force acting on it that impels it to move in a curve, and if the bicycle is turning to the right it can only be because there is a force acting on it towards the right. This is the force that is rightly called "centripetal." It is a force directed to the centre of the circle in which we suppose the bicycle to be moving.

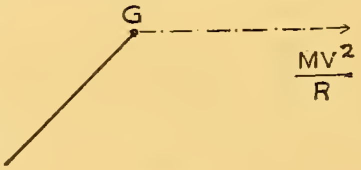


Fig. 2

Now we ask: Whence comes this force? A body cannot exert force on itself as a whole, though one part of a body may exert force on another part. The bicyclist cannot exert force on himself, but he can exert it, by means of his bicycle, on the ground, thereby causing the ground to react upon him—on the principle that action and reaction are equal and opposite.

What the bicyclist does then when he would move in a circle is (unconsciously it may be) to push against the ground with a horizontal force radially outwards. The ground responds with an equal and opposite force which is inwards. In fact, the ground supplies the centripetal force without which the bicycle could not possibly move in the circle. If the ground were perfectly smooth it could not create this force. And if the ground be rough, but not sufficiently rough to supply the needful force, a skid will result. It is a well-known fact that the force of friction that the ground is capable of exerting cannot exceed a certain quantity μR, where μ is called the coefficient of friction, and R is equal to the vertical pressure of the bicycle on the ground.

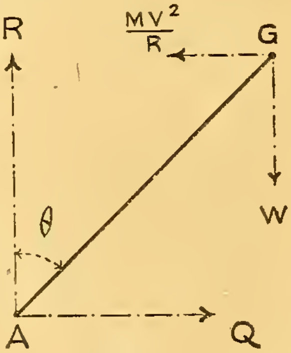


Fig. 3.

Let us suppose that the ground is sufficiently rough to allow of the bicycle's describing the arc of a circle, and let us suppose Q to be the force of friction exerted by the ground radially inwards. The forces acting on the bicycle and rider (regarded as one) may be expressed and calculated as follows:

W, their joint weight acting vertically through G, the centre of gravity.

R, the vertical reaction of the ground.

Q, the radial friction from the ground.

These forces will supply that which is necessary to make the bicycle move in the circle.

Now, in order that a body of mass m may move in a circle of radius r with velocity v, the force towards the centre must be $\frac{mv^2}{r}$. This is established in any text book of dynamics.

The centre of gravity of the whole bicycle and rider regarded as one will refuse to move in a circle unless the forces actually acting supply a force $\frac{mv^2}{r}$ through the centre of gravity and acting radially inwards.

The forces actually acting are R, Q, and W, as explained above. $\frac{mv^2}{r}$ is not a force actually acting. It represents what the forces acting must be equivalent to if the bicycle moves as it does.

As then the forces represented in fig. 1 are equivalent to $\frac{mv^2}{r}$, as shown in fig. 2, it is plain that forces, supposing them to exist as in fig. 3, would be in equilibrium.

Now it is this $\frac{mv^2}{r}$ (imagined acting radially *outwards* through G) to which the term centrifugal force is applied. But, as we see, it is not an *actual* force, so that the term is apt to mislead, and, as your correspondence shows, it has misled "Lieut. R.F.A."

Now as forces as shown in fig. 3 would be in equilibrium (note that we cannot say they *are* in equilibrium, for the $\frac{mv^2}{r}$ is non-existent as a force, and the bicycle and rider are not in equilibrium but moving in the circle), we must have by resolving vertically and horizontally

$$R = W$$

$$Q = \frac{mv^2}{r}$$

(which show that the vertical and horizontal forces form each a couple), and taking moments round A, the point of contact with the ground, we have, if θ be the inclination of AG to the vertical—

$$W \times AG \sin\theta = \frac{mv^2}{r} AG \cos\theta$$

$$\text{Whence } \tan\theta = \frac{mv^2}{rW}$$

and $W = mg$, so that

$$\tan\theta = \frac{v^2}{gr}$$

This gives the inclination of the bicycle to the vertical, and we see that for a given velocity the smaller r is the greater must θ be.

In conclusion, let it be understood that what is called centrifugal force is not really a force at all. It is a convenient fiction. It gives a measure of the tendency of the body to refuse to move in the circle; in other words, it is a kind of inertia.

MATHEMATICIAN.

Sir,—I think centrifugal forces play a part in keeping a bicycle upright, but I bring you here proof that the aid of these forces can be dispensed with. Many of your readers will remember some bicycle races which were held on music hall stages about twenty years ago. The machines were placed on four rollers—two for the hind wheel and two for the front one. One of the back rollers was connected with one of the front rollers, so that when the cyclist was pedalling the two wheels were spinning, but the bicycle did not move forward.

To start, the racers were held up by assistants, and after a few moments they were left standing alone and pedalling frantically, keeping perfect equilibrium.

It seems to me that the way of keeping the balance was only by leaning against the forces produced by the spinning of the wheels acting as gyroscopes.

ALLIED.

Davos-Platz.

FLYING FACTS AND THEORIES.

Sir,—I read with great interest Mr. Aston's article on "Flying Facts and Theories" in your issue of January 3rd. I am convinced, however, that he deals rather abruptly with "O.J.F.S." I am acquainted only with the practical side of aviation, and do not for a moment question Mr. Aston's ability in dealing with the technical side of the matter, but I would like to point out to him that it is quite possible to turn by the "feel" of the machine without referring to the various instruments on the dashboard. Indeed, in the R.F.C. it is the custom to impress upon pupils the necessity of flying as much as possible *without* using the instruments.

To get back to the point, however. In turning by "feel," the nose of the machine is kept just level with the horizon, and any deviation from this position is immediately corrected by means of the elevators. If the turn is correctly carried out (*i.e.*, correct proportion of rudder and bank), the pilot experiences a sensation of being pushed hard against the seat. If the machine is overbanked and sideslips inwards, a strong draught is felt on the side of the face, and the sickening "tube lift" feeling of dropping into space is experienced. If, however, the machine is underbanked and sideslips outwards (*i.e.*, a flat spin), a most unpleasant sensation results. All the surplus air in the neighbourhood appears to be forced up the nose and great pressure is felt on both sides of the head, seeming to push both sides of the head together. Naturally, when these incidents occur during a turn, the pilot is able to correct his errors.

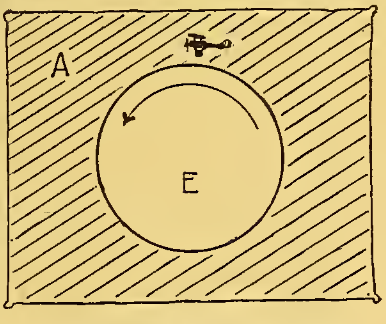
This may all seem irrelevant to the subject in question, namely, loss of height or speed in turning, but it is the outcome of a sentence in Mr. Aston's article which reads, "Next as to the 'feel' of the machine; this seems to be a singularly inexact method of doing things, and, after all, what *is* the 'feel' of the machine?"

I have tried, to the best of my poor ability, to answer this question. JACOBUS, R.F.C.

Sir,—As Mr. Aston's articles on "Flying Facts and Theories" may produce a further crop of letters from those who do not grasp the simplicity of the conditions governing the turning of an aeroplane "up" or "down" wind, may I save some of them from rushing into print by suggesting that they look at the matter in the following way.

Wind is a change in the relative positions of the air and the earth. Either of these can be considered as the stationary member, and the conception of flight in relation to wind is simplified by considering the air as stationary and the earth as in motion.

If A is the air and E the earth, the only connection between E and a body in A, not in contact with E, is gravity. As gravity is not affected by the rotation of E, this rotation can be ignored entirely until the body in A comes, or prepares to come, into contact, or is in danger of coming into contact, with E. W. J. LANGMAN.



A diagrammatic explanation of relative motion. (See letter from W. J. Langman.)

Sir,—Being a reader of your very excellent "Blue 'Un," I have taken a great deal of interest in the articles on flying by Mr. W. G. Aston, and also the letters of many critics.

It seems to me that if a body can turn (when not supported other than by the power of its engine) without losing height or putting extra energy forth, we must truly have arrived at a stage when man will be able to walk in mid-air.

A machine that is climbing may be able to turn, but in doing so it does not climb so fast as if it were travelling in a straight line, because in turning the altered position of the ailerons (I think that is the right name) causes a little more resistance to its rate of movement, therefore more power must be exerted to keep the same rate of motion.

In the turn when flying level, the machine will turn on its side a trifle, so causing less resistance to the air; consequently any unsupported body, by the laws of gravity, will commence to drop. To counteract this tendency to lose altitude, extra power must be exerted by the engine.

Would any of our pilots be so kind as to prove the argument in the course of their duties, as positive proof would be extremely useful? I think "O.J.F.S.," and "F.M.C.H." ought to try this, and then they may be convinced that weight needs support if it must retain its altitude. L.B., R.A.M.C.
(A Hopeful Pilot to be).

GOODS MADE IN GERMANY.

Sir,—Hearty congratulations on your attitude taken *re* goods "Hunnish." I shall take your paper as long as you continue to stand up for the "Right." I am never going to buy, or help the sale of, anything German!

St. Albans. TRIUMPH.

Sir,—Since I first wrote on the subject of Mr. C. S. Ives's communication you have received many other letters on this subject. With one or two exceptions they have all been in agreement, and rightly so. "R.O.W." talks about the German people being victims of Prussianism and nonsense of that kind. Mr. H. Leavis confesses to sharing the contemptuous irritation of Mr. Ives. Had he termed it "contemptible irritation" he would have been nearer the mark.

This is not, however, my object in writing this letter. What I really want to point out is this. I believe there is no doubt as to the authenticity of the German Corpse Factory. Many German goods, therefore, will in all probability contain products of this ghastly factory. It is not a pleasant thought, but that makes it none the less true. How anybody, knowing about this factory, can want to buy goods made in Germany, either after the war or at the present time, is to me incredible.

Here let me leave Mr. Ives and those who agree with him to enjoy in full the delicacies of the Corpse Factory, and I feel certain that British people will be only too glad to let them have their shares. C. A. HARRISON.

Sir,—I crave the liberty of your letters page to air my views regarding German-made goods, or, I should say, goods made in Germany, as there is no mention of goods made by a German if he be resident in England. It is to be hard luck for the German: he has heaped the trouble on his own back, and naturally deserves to suffer. I have no sympathy with him.

But what of the owners of German machines? There are many of them in this country, and they are mostly in the possession of enthusiasts who cannot afford to scrap them and buy new British or American-made machines. I think it is a mistake to insert the "Important Notice" week after week in *The Motor Cycle*. It is not in any other paper I have seen. The recommendation agreed upon at the Paris Economic Conference will never stand; it is like Chas. S. Ives's letter—an impulse of the moment. Our statesmen are beginning to see it is a mistake to shout about this trade war after the war. The latest is Mr. Lowther, Speaker of the House of Commons, at a war aims meeting at Carlisle on 29th December, who said *re* a trade boycott: It has been suggested that, whatever the terms of peace, we in Britain would have no dealings with Germany, and that we should boycott her commercially in combination with our Allies, and treat her as if she were a leper. He (Mr. Lowther) did not believe in that. If the recommendation passed at the Paris Conference is to stand it would simply be a means of carrying on the war; there would be the same hatred and the same struggle between one combination of nations and another—in fact, it would be in many respects almost as bad as the present war.

I am not so narrow-minded as to stop *The Motor Cycle* because of a notice appearing in it that I do not like; I can afford to wait a little, and no doubt the item referred to will disappear as quickly as it came. Wishing *The Motor Cycle* every success, J.S.B.

Woodside.

[*The Motor Cycle* and sister journals are now not the only papers to publish a notice of this nature.—ED.]

A SPORTING CHALLENGE.

Sir,—I notice Mr. S. A. Marks, in your issue of January 3rd, states he would be delighted to put his Model K Harley against any 8 h.p. J.A.P.-engined motor cycle, 85½×85. I have a motor cycle fitted with this engine, and shall be delighted to give him a run if he will kindly state under what conditions he wishes to run when circumstances allow.

Cardiff. A.C.

Sir,—In *The Motor Cycle* of December 20th I notice a letter from "Be Sportsmen" (Coventry), in which he states, in reference to the sporting challenge, that "every rider (obscure and otherwise) who has a machine he thinks can 'lick creation' is sending in challenges." Well, I have been at the game a few years—perhaps long enough to get past the "licking creation" stage—yet I have to suppose that I am one referred to, and probably as "obscure." The sum total of my letter is that I absolutely do not credit that a standard 85½×85 s.v. J.A.P.-engined machine can do over 70 m.p.h. as equipped at the time of the run.

Has "Be Sportsmen" not followed the papers and racing enough to know that the fastest km. on Brooklands with a light shell sidecar and stripped special machine stands at 72 m.p.h.?

I consider it was far more sporting to challenge the statement as I did, and back up my opinions by offering to match my machine on equal c.c. terms, than to make statements over a *nom de plume* totally unfitting and in direct contradiction to the tone of your correspondent's letter. Yet my letter and challenge have been ignored. I beg to assure "Be Sportsmen" that I shall, I hope, be one to help the frequency of these sporting events.

No one, to my knowledge, has suggested that the sporting event was other than a fair and square test, and I agree that the result, given ordinary conditions, was inevitable, in spite of Mr. Jones's great knowledge and ability, but we must not forget to give just a little credit where it is due.

I still stick to my challenge, and extend it further—*i.e.*, conditions exactly as before, but for a distance from 50 to 500 miles, solo or sidecar. I am a private owner with no trade interest at present, and, although in khaki, I am in such a position as to be kept well in touch with right up-to-date practice in the motor cycle world, and if "Be Sportsmen" will not ignore me altogether I feel sure we could have a real good sporting event worthy of the "great pastime and industry."

BERT HOULDING (M.T., A.S.C.)

Sir,—In the issue of January 3rd I saw letters from "Stiffy's Master" and S. A. Marks, gentlemen who know many things, but keep the information to themselves.

Their complaint of the W.D. Triumph is its low max. speed. I think it is only fair to this machine to mention a few particulars of why it is slow, and should not be compared with Brooklands specials, T.T. racers, etc., and then give my own experience of the same model, but in the hands of a private owner.

The W.D. Triumph is fitted with a top gear ratio of 5 to 1, as it is intended as a heavy-duty machine, suitable for cross-country work, etc. Also the carburetter is fitted with a jet No. 28. This I measured and found it to be .03in., or as usually called a 30 jet. This is generally considered small for an engine of 550 c.c. capacity.

I cannot remember what max. speed I got with the 5 to 1 gear, as it was delivered in April, 1915, but know a similar model which can touch forty miles per hour with this gear ratio when pulling a sidecar.

I have tried top gear ratios of 5, 4½, 4¼, and 4 to 1; the latter, with a .035in. bore jet, makes it quite a fast machine. I use a 4¼ gear, as the large sprocket caused the chain to rattle in the chainguard when the chain got slack. I am not fond of very high speeds, but my experience is as follows:

Using 4¼ to 1 gear, standard jet, standard roadster timing of valves and ignition, and Scotch petrol, I got fifty-three miles per hour. Again, as above, but with the .035in. bore jet and white spirit, I got fifty-five miles per hour. I exceeded these speeds with a Senspray carburetter, but D.O.R.A. prevented me from getting definite figures. The speeds mentioned are taken from a Bonniksen speedometer, which is considered as true as any.

I add the usual disclaimer. TRIUMPH.

Partick.

A MIRACULOUS PLUG.

Sir,—May I confirm all that "Ixion" relates in his "Occasional Comments" with reference to the Sphinx Mark C25 plugs, which I can characterise as only a little short of wonderful.

The machine in question was a Scott combination, and, not being able to obtain the plugs recommended by the makers, it was with dismay that I saw the machine rapidly ruin plug after plug of various well-known makes, which *would* work while other types which were tried refused to work at all. In no case would the machine start until the plugs had been taken out and cleaned and primed with petrol, even after a short stop, and top speed with sidecar empty was about 26 m.p.h.

Eventually the Sphinx people, whose plugs I had not used before in this engine, advised me to try their Mark C25, when I was agreeably surprised to find the speed increase to 45 m.p.h. on a private road with throttle half open, while on low gear the engine fired quite regularly at 3 m.p.h.

The machine now starts quite easily, and the plugs have never been out since they were put in some weeks ago.

It is true that about the beginning of the experiment I made a winter adjustment to the Binks carburetter, but that should not greatly affect matters. Usual disclaimer.

BATEMAN SCOTT.

HOW MANY GEARS?

Sir,—I was greatly amused and vexed to find two able contributors like "Ixion" and "Chinook" wrangling over the question of three and four-speed gears. In my recent motor cycling experience—at one time I rode an old accumulator Wolf and in those days twenty gears would not have helped us much—I never owned a machine on which I saw any dire necessity for more than two gears.

I live in Scotland, which I have toured extensively, so your touring readers will know what that means. But let me note this: I have never attempted to run a sidecar on a 3½ h.p. engine. To my mind, that is the essence of folly, and ultimately ends in trouble and expense. I have seen it done too often by novices not to know.

My last mount, which I parted with on crossing in 1914, was a big single of close on 600 c.c., with two-speed gear.

In July, 1914, I circled Scotland in six days, with a 10 stone passenger, *viâ* Aberdeen, Inverness, south side of Loch Ness to Fort William, Oban, Callander, and Edinburgh, and, with the exception of the road south side of Loch Ness, had little low gear work. Again, a week later, I went from Stirling to Ballachulish Pier in exactly four hours, with empty sidecar, *viâ* Callander, Tyndrum, Glenorchy, over the Black Mount, and through Glencoe, almost an average of 25 m.p.h., *and never once used the low gear.*

I believe that a large number of the older school—not the Triumph and Douglas D.R.'s of the war period—will agree with me that, given the engine power, two gears are quite sufficient for them. LIEUT. (Retired).

Edinburgh.

3D.

THE PRICE of THE MOTOR CYCLE TO BE RAISED TO 3D. ON FEB. 7th.

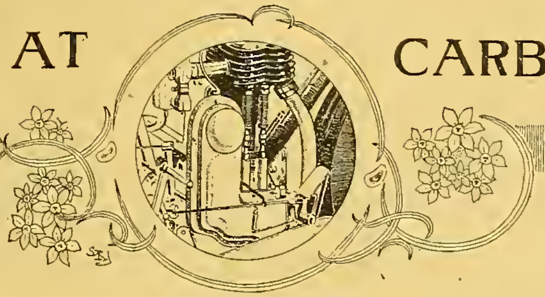
This further increase is necessary owing to the drastic restriction imposed on the import of paper and paper making materials during 1918 and the consequent heavy advance in the cost of paper, but the price will be reduced as soon as circumstances permit.

The subscription rates will be correspondingly raised on renewal or to new subscribers:

British Isles	**15/2**	**per annum, post free.**
All countries abroad..	**19/6**	**,, ,,**

All subscriptions current at the time of reducing the price will be proportionately lengthened for the benefit of each subscriber.

FUEL LOSS AT CARBURETTER.



Points of Wastage in Carburetter Design.

PETROIL lubrication in two-strokes has no doubt had its day, but I think there is one thing which it has taught us.

We have all been struck with the enormous amount of oil collecting around the carburetter. We find it covering the float chamber, the outside of the jet, the extra air inlet, and the main air inlet; in fact, all over the carburetter inside and outside. We clean the carburetter bright before we start out on a run, and in five or six miles it is as oily as ever. This oil, then, is evidence of a continual loss of petrol. And we must remember that for all oil visible or wasted we must multiply our loss of petrol by sixteen.

In an engine with separate lubrication we have the same losses going on, but not made apparent as in the case of petroil. In an article on "Carburetters" in *The Motor Cycle* of November 1st, "Chinook" drew attention to the waste of petrol in a jet carburetter. It is intended here to analyse these losses a little more closely.

We will first consider the losses due solely to leakages at joints, unions, etc. The float chamber screw top is a great culprit in this respect, while the unions on the petrol pipe do not lag far behind. In works where a considerable amount of petrol piping is used it is necessary that all joints in screwed piping be absolutely tight, and the best practical method of securing this is found to be by smearing the thread with a stiff solution of shellac dissolved in methylated spirit. The thread is then screwed home and the shellac provides a film which is impervious to petrol *so long as the screwed thread is undisturbed*. The moral is—make your screwed joints with shellac and do not unscrew them unless absolutely necessary. When they have to be disturbed remake with shellac.

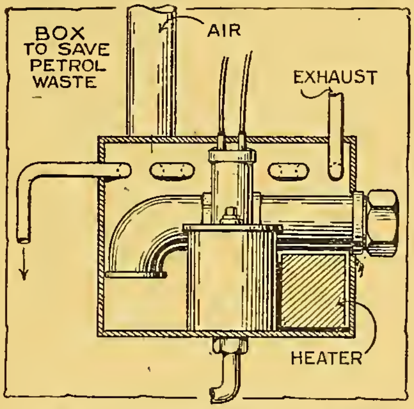


Fig. 1.—An effective method of stopping petrol wastage would be to box the carburetter.

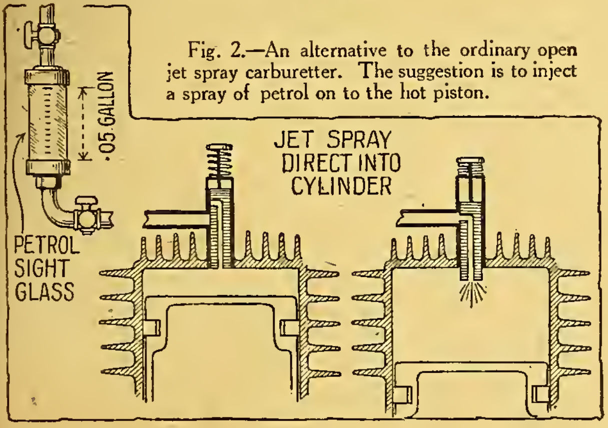


Fig. 2.—An alternative to the ordinary open jet spray carburetter. The suggestion is to inject a spray of petrol on to the hot piston.

For float or flanged joints it is usual to use asbestos millboard soaked in water. This makes a good joint when the flanges are screwed up.

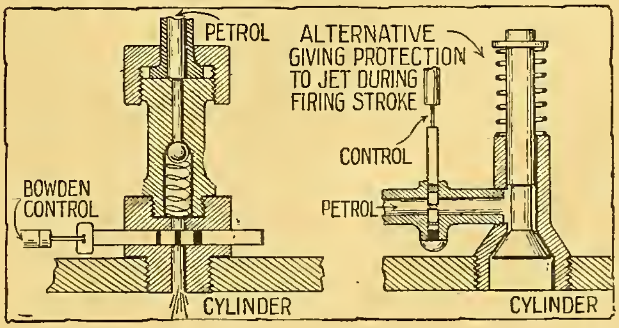
So much for pure leakage. We now come to the losses due to the exigencies of carburation.

Blow Back.

If we take the trouble to observe the jet of a carburetter when the float is depressed to flood it, we notice that a spray of petrol ½in. to ¾in. in height comes out of the jet. Now every suction stroke there is a jet of petrol two or three times as great as this sprayed into the centre of the carburetter. Some of it is vaporised and some of it carried forward mechanically by the air to the cylinder. It is worth while at this point to consider what amount of air is passing to the cylinder and under what conditions. Let up suppose the cylinder = 500 c.c. = 30.5 cubic inches. Engine running at 1,200 r.p.m. There will in this case be 600 suction strokes per minute.

We cannot expect the full capacity of the cylinder to be filled; we will, therefore, suppose 20 cubic inches of air drawn in during suction stroke. This through a 1in. inside diameter pipe gives $\frac{20 \times 600}{.7854 \times 60} = 254.6$ inches per second speed of air (average speed) through induction pipe. We have assumed that the cylinder was only two-thirds full when inlet valve closed; we may therefore take it that the air was travelling at at least its average speed when the valve closed. By thinking of this speed 254.6 inches (21.2ft.) per sec. we are enabled to imagine what will happen when this column of air is brought to a sudden stop. There will be

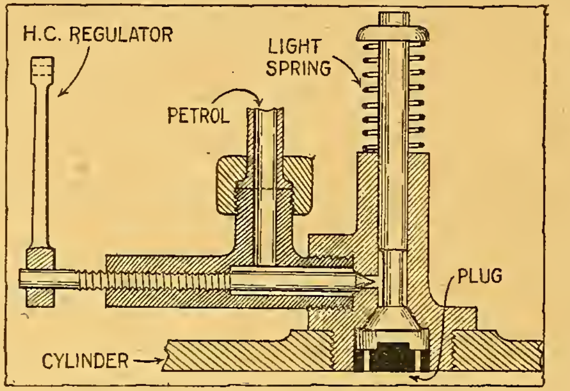
Fig. 3.—Showing operation of suction stroke, and an alternative design.



Fuel Loss at Carburetter.—
an expansion of the air back through the carburetter and its air orifices. This "blow-back," as it is called, simply flings petrol into every corner or crevice of the carburetter.

Notwithstanding the clearness with which we can see all this we have up to the present been quite content deliberately to waste 25% or 30% of our petrol if we could at the same time run our engine without bother. Now that petrol is, with us, like the memory of a dear departed friend, we are beginning, as is the custom with human beings, to be troubled with "past regrets." We must make up our minds in future, however, not to keep the petrol dealer going on the same lines as the mustard manufacturer, who lives by what we waste rather than by what we use.

The only method really certain of getting the best out of a jet carburetter from the point of view of petrol economy would seem to be to box in the whole contraption, leaving only an orifice for air with a rather long suction pipe (see fig. 1). Incidentally the box would be a smooth fitting, easily cleaned, which would keep out all road dust. The box would be airtight, and a bypass could be taken through from the exhaust, which would greatly assist in the vaporisation of the fuel.



AN ALTERNATIVE TO ORDINARY CARBURETTERS.

Operation: M.O.I.V. (inlet valve) arranged to open one-third to half-way down stroke. Partial vacuum opens petrol valve and a charge is drawn into cylinder through the jet regulator. The petrol is vaporised by heat of piston and cylinder assisted by partial vacuum. The plug shown acts as stop for valve, as a distributer, and also imparts heat to the charge on its way into the cylinder. The arrangement could be screwed into exhaust cap. M.O. inlet valve admits required air. This being independent of carburation can be exactly regulated.

An alternative to the ordinary open jet spray carburetter is here suggested.

The arrangement is to inject a spray of petrol on to the hot piston head and then to bring in the air to make a suitable mixture.

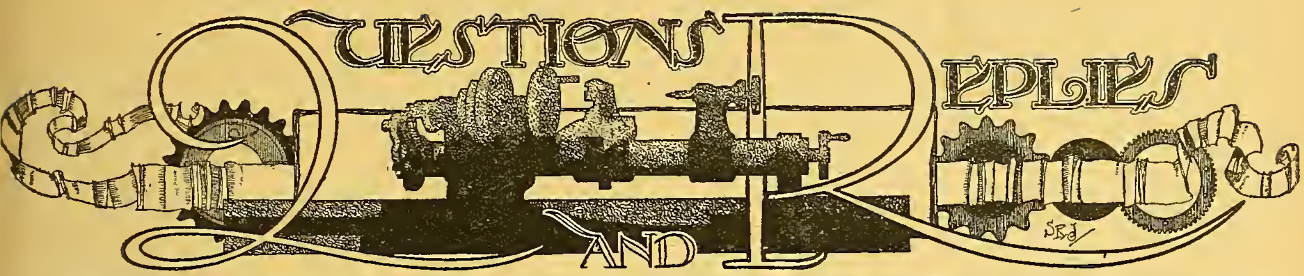
In order to do this the inlet valve is made to remain closed for the first half of the suction stroke, thus inducing a partial vacuum in the cylinder. This lowered pressure operates the jet, as will be seen by methods made clear in the sketches (figs. 2 and 3). The inlet valve opening at half stroke allows air to enter and form the mixture. No carburetter is needed and nothing passes through the inlet valve except air. The petrol is vaporised by dropping on to the hot piston head, vaporisation being assisted by partial vacuum. Starting up from cold will be easier than by ordinary carburation, for we know it is a common practice to inject a few drops of petrol into the cylinder to enable one to get an easy start in cold weather.

The sketch also shows an arrangement for feeding the petrol.

The methods here shown are capable of being varied in a number of ways to carry out the same object. A petrol engine carburetted on the lines suggested should give a better m.p.g. figure than the ordinary engine.

ENGRO.

HISTORIC WINDSOR. Windsor is one of the most ancient and picturesque of towns, and was a frequent resort for London motor cyclists in peace times. The sidecar in the foreground is a Rudge.



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not must be accompanied by a stamped addressed envelope for reply. Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Oxidising Steel.

? Will you please tell me the process for oxidising steel (blue) similar to that of guns and other firearms?—F.A.P.W.

The bluing of steel is a trade in itself, and its successful accomplishment necessitates the use of several trade secrets. You might care to try the following method at your own risk: Prepare in a glass jar a mixture of 200 grammes of bichloride of iron and 200 grammes of iron filings—the latter very fine, perfectly washed, and entirely free from grease—and 100 grammes of sulphuric acid, and stir together. The precipitate that will be formed during this process may be used for oxidisation, being applied by means of a sponge or pencil brush (made of spun glass wire) to the part to be oxidised, which has been previously thoroughly cleaned. The part to be oxidised is then heated in a steam or vapour bath, and afterwards dried in hot air. After drying it is left in boiling oil for fifteen to twenty minutes, and afterwards thoroughly cleaned.

A Deal in Stolen Machines.

? I advertised my Triumph combination in a recent issue of *The Motor Cycle* in the exchange column. In reply to the advertisement two men came from Harrogate two days later bringing a Bradbury outfit. We agreed to exchange, I to pay £8. I paid part of the money and lent them a new motor coat and an overcoat, which they promised to return on the Monday, but failed to do so. They promised to come again in a fortnight or so for the remaining money. They did not arrive for six weeks, and then came without the coats, so I did not pay them. On the following Thursday the police came and demanded the Bradbury as a stolen machine, saying the two men were locked up at Leeds as the thieves. The police also stated that my machine was sold at Taunton, and they did not think I should be able to claim it back as they thought it was sold for cash. Will you let me know what to do?—F.W.T.

We are afraid you are in rather a difficult osition with regard to the two machines —both the one that you purchased and your own that you lost. As the machine hat you took was a stolen machine the revious owner may claim its return, and, we are afraid, you will have no hold upon . On the other hand, of course, the urchaser of your old machine may be ompelled to return it, and it is up to you to find out who the present owner is, by means of the proceedings that presumably are about to take place at Leeds Assizes, and then to request the present owner to return the machine to you. He, in return, should be able to recover any cash he paid for the machine from the man to whom he paid it, but whether he obtains this cash or not will not, we believe, prejudice in any way your claim to have your machine returned.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

Overheating.

? I have a motor cycle and sidecar fitted with a 3½ h.p. J.A.P. engine and Armstrong three-speed gear. It has run well since it was taken down and decarbonised three months ago until a week or so back, and will now only pull with any strength at all on lowest gear, which, in a few minutes, makes the top of the exhaust pipe red hot. The spark is good, and the carburetter appears quite in order. The engine will race on low gear when once started, but slows up and stops immediately on changing to second gear unless, of course, down hill. Instead of the usual sharp crack from the exhaust I notice more of a "thud" than otherwise — quite a different sound from what it should be. The gears have just been overhauled and renewed.—F.A.J.H.

First of all make sure everything is free. This can be done by taking out the plug and turning the engine over by means of the back wheel with the top gear engaged. You may find that an accumulation of mud inside the guards is preventing the wheels from turning freely. Next replace the plug and test compression. Make sure there is no leaking round the valve caps, etc. Take out the valves, and, if necessary, grind them in. Try a new plug, correct adjustment of valve tappets, and finally check the valve timing, which may possibly have slipped and be the sole cause of your trouble.

M.E.P.

? *The Motor Cycle*, dealing with the new 1918 Harley-Davidson machine, uses some terms and expressions which I—a novice—do not quite understand, and I should be grateful for an explanation of them. They occur in the latter portion of the paragraph entitled "Ignition and Timing." What are the m.e.p. curves, and what is the meaning of the compression ratio 4.12 to 1?—H.E.C.

M.E.P. means "mean effective pressure"—that is to say, the average pressure of the explosion on the piston throughout the length of the stroke. The "compression ratio" means the ratio between the total cylinder volume with the piston at the bottom of the stroke and the compression space with the piston at the top of the stroke. These subjects, and others of a similar nature, will be dealt with shortly in articles in *The Motor Cycle.*

Engine will not Start.

? I have had my engine down and the timing wheels out. I also had the magneto repaired, and it gives a good spark. I am sure I have got the valve timing correct. Now when I prime the engine it will go all right for about fifty yards and then stop, and if I prime again it will do the same. I might say it is getting petrol all right. Would a motor cycle run fifty yards firing all the time if the magneto timing and valve timing were wrong? I myself do not think it would, so if you could let me know the cause I should be grateful. —C.F.

The trouble is almost undoubtedly due to the fact that in assembling the machine —probably in attaching the carburetter—you have omitted to see that the carburetter or induction pipe unions are quite airtight. If this be the case, the reason why the machine will not run is owing to too weak a mixture. Evidently the timing is correct. On starting up the engine runs on the fuel you have injected, and immediately this runs out and it is solely dependent on the carburetter it stops. To assure yourself that carburation is to blame, pour scalding water over the induction pipe, thus thoroughly warming it, and probably your engine will start and run irregularly without an injection. Then, with the engine just running, bind suspicious joints with insulation tape. The engine will alter its speed when you strike the leak.

Transferring a Number.

? I have bought a motor cycle and sidecar, which I intend to store until we are allowed to ride again for pleasure. Will you kindly give me the necessary information as regards licences and registration? Shall I have to notify the change of ownership? If so, will you please instruct me? Shall I have to take out licences and registration before I am able to ride?—B.H.

All you need do is to have the registration transferred to your name, if the previous owner has not already cancelled it. Nothing else is required. You apply to the clerk of the county or borough council where the machine was registered and give full particulars as to change of ownership. You need not take out any licences until you use the machine.

Removal of Tappet Guides.

? What is the best method of removing tappet guides from a 1910 3½ h.p. Triumph? I have obtained new guides and tappets, but find difficulty in removing the old guides. I am afraid of injuring the crank case, but am enough of a mechanic to do the job more carefully than will be done by a garage. Is there any special tool necessary? I have plenty of tools for ordinary fitting, etc., and I have a holy horror of the ordinary mechanic.—J.C.

The removal of the tappet guides should be begun by means of a right-angled punch. Before you can attempt the job you must remove, of course, the cylinder and the timing gear case, and then you may drive the tappet guides upwards from inside the timing gear case. When the guides have been started by means of the right-angled punch, the movement may be completed by means of an ordinary straight punch.

Use of Petrol.

? My occupation is that of a country water rate collector and inspector. The district is an area within a radius of ten miles of a city. It is not traversed by motor 'buses, and is purely of a country nature, my clients being mostly farmers. I have only taken this position during the war, having taken the place of the regular collector, who was of military age. I have been invalided from the Royal Navy. My age is fifty-four, and doubtful health will not permit of my riding an ordinary cycle. The above is the *sole* purpose for which I wish to use the machine, but I am wondering if I can safely use what little petrol I have without a petrol licence, which I am now unable to obtain.—W.J.M.

The opinions of individual benches of magistrates vary to such an extent that it is impossible to advise anyone as to whether he may use a machine with impunity if there is the slightest room for doubt in the matter. We should imagine you would be quite safe, but regret that we cannot give you any definite ruling. You would be well advised to mention the matter to your local police officer.

Making a Kick-starter.

? I am making a kick-starter for my motor cycle, which is fitted with an Armstrong Mark VI. hub gear. Will you kindly inform me on the following: (1.) What should the gear ratio be between the chain sprocket and the kick-starter? (2.) What length should the kick-starter crank be?—J.S.N.

(1.) The gear ratio between the chain sprocket on the hub and the sprocket on the kick-starter could conveniently be anything from about 1.75 to 3. Perhaps the most satisfactory would be about 2.3. (2.) The length of the crank is dependent on the gear ratio, say between 6in. and 7in. with the 2.3 ratio.

Liquid Hydrogen as a Petrol Substitute.

? Is liquid hydrogen a possible fuel for motor cycles? Are any experiments being made upon it? Apart from the great problem of storing, surely the idea is feasible.—O.W.

The application of liquid hydrogen as a fuel is quite impossible. The first objection is the cost, which is insuperable; the second is the difficulty of storage; and the third is in the nature of the explosion, which is far too violent for use in an engine. Hydrogen is the most difficult of all ordinary gases to liquefy, and, while its liquefaction is a common accomplishment in the laboratory, we have never heard of any experiments being made upon the use of liquid hydrogen as a motor fuel.

Changing the Gear Box.

? I should be obliged if you would give me particulars regarding Douglas gear boxes. Can a three-speed Douglas gear box be fitted to a Douglas machine that is at present fitted with a two-speed Douglas gear box? What is the correct size of Amac jet for a 2¾ h.p. Douglas during the winter months? I am at present troubled by heating up on the slightest incline, till finally the machine stops completely. Please let me know the cause and any possible remedies.—F.O'N.

A three-speed gear box could be fitted to a two-speed Douglas if you consider it worth the expense. If a 1913 Amac a 28 jet, if 1914 26 or 27, if the latest model 26. Probably your trouble is due to a weak exhaust valve spring, or to too much clearance between the exhaust valve tappets and the bottom of the exhaust valves.

Starting from Rest.

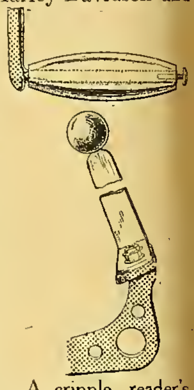
? (1.) I have always been under the impression, and have always pursued the course, that when first taking out a machine on to the road it is quite correct to start off with the low gear engaged. My friend has heard from a garage proprietor that this is not the case, but the machine should be started in high gear. The machine referred to is a 1914 7-9 h.p. Indian. (2.) Does your answer to question (1) also apply to a motor car?—C.R.S.

(1.) It very much depends upon the circumstances. If you are pushing off to start on a level road you engage the high gear. Naturally, if you start by means of a kick starter and use the clutch, the low gear should be engaged. In cases where the compression of the engine can easily be overcome when pushing off, the engine is more likely to fire at once on the low gear on account of the higher revolutions, but with a sticky engine, or one which has a high compression, it is obviously easier to overcome the resistance when the top is in engagement. (2.) In the case of a motor car it is invariably the practice to start on first, or lowest, speed, unless the car is on a down grade or the low gear is so low that the second is enough for the purpose.

READER'S REPLY.

Machines for Cripples.

I am unable to use my feet except for standing and walking short distances, and that with the aid of irons worn on the legs and crutches. I have been riding over six years, and have found my present machine—a 7-9 h.p. Harley-Davidson and sidecar—to be the most satisfactory. Only two alterations, both quite simple, were necessary. First, a lever bolted on to the brake pedal so that it could be operated by hand. Secondly, the right-side pedal of the kick starter (1915 machine) was removed from its spindle, a plain boxwood handle turned to be an easy fit and of such a length as allows the spindle to project $\frac{1}{16}$in. beyond it. The end of the spindle was then drilled and tapped and a mushroom-headed bolt fitted to keep the handle in its place. I think the accompanying rough sketch will explain my meaning. I hope this will prove of use to your correspondent. To my mind, driving from the sidecar is attended by the following disadvantages: The back wheel does not grip the road very well and is prone to skid when braking and ascending hills, and one cannot carry a passenger except on the carrier.—E. J. L. STRONG.



A cripple reader's alterations to a Harley-Davidson kick-starter.

RECOMMENDED ROUTES.

STROOD TO DURRINGTON.—C.M.

Strood, Snodland, Borough Green, Riverhead, Westerham, Redhill, Dorking, Guildford, Farnham, Odiham, Basingstoke, Whitchurch, Andover, Amesbury, Durrington.

FRINTON-ON-SEA TO HOLYHEAD.—L.A.

Frinton, Weeley, Colchester, Halstead, Haverhill, Linton, Cambridge, Godmanchester, Thrapston, Kettering, Market Harborough, Husbands Bosworth, Lutterworth, Atherstone, along Watling Street *viâ* Weeford, Gailey, Weston, Oakengates, Shrewsbury, West Felton, Llangollen, Corwen, Cerrig-y-Druidion, Bettws-y-Coed, Capel Curig, Bangor, Holyhead. Approximately 300 miles.

C.A.V. Magnetos

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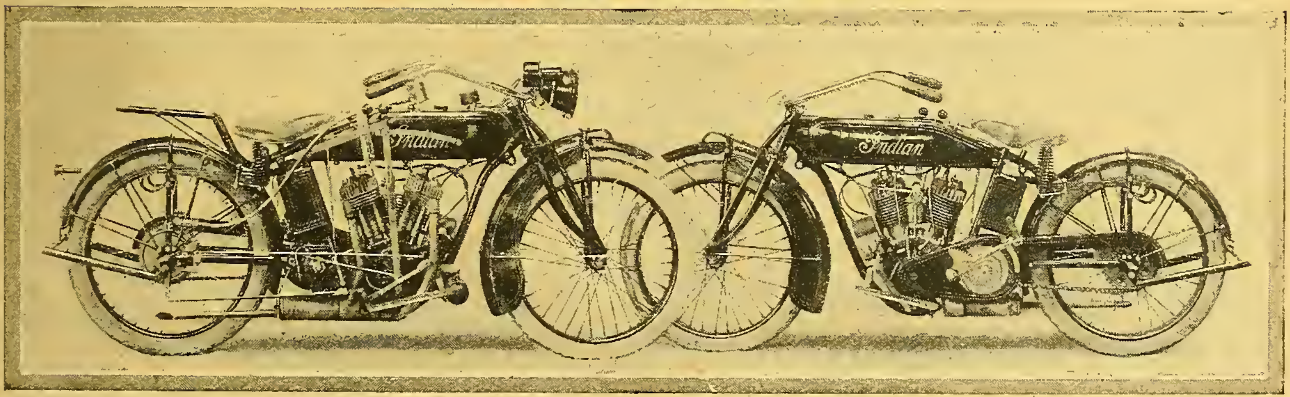
C. A. VANDERVELL & CO., LTD.

Electrical Engineers

ACTON, LONDON, W.3

Members of the British Ignition Apparatus Assn.

1918 Powerplus Indian Motocycles



Which we trust will be Post-War Models.

We regret that we are not in a position to supply motorcycles or send out catalogues at the present time, but when we are able to do so we will freely advertise the fact. This applies to Great Britain only.

"Indian Motocycle"
Hendee Manufacturing Co.

HENDEE MANUFACTURING CO.,
"Indian House," 366-368, Euston Road, London, N.W.
Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA, 109-113, Russell St., Melbourne.
CANADIAN WORKS, 12-14, Mercer St., Toronto.
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Indian House, 579, West Street, Durban.
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MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns —First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S., 1914, 2¾h.p., 2-speed, kick starter, hand controlled clutch, in perfect condition; £28.—F. Hill, Birchwood, Alfreton. [X0917

1916 A.J.S. Combination, hood, wind screen, spare wheel, 5,000 miles by speedometer; £85.—Write, Box, 1,588, c/o *The Motor Cycle.* [X0863

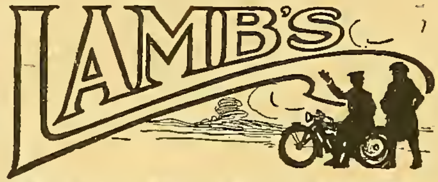
A.J.S., 1914, 2-speed, clutch, and K.S., all-chain drive, £37/15; 1913 model, £35; E.P. or exchange.—The Service Co, 292, High Holborn, W.C.1. [X0956

A.J.S. Motor Cycles.—Immediate delivery of the very latest 6h.p. models from stock.—The A.J.S. Specialists, The Walsall Garage, Walsall. Tel.: 444. [X9872

A.J.S. Motor Cycles; immediate delivery of special 1917 model, complete, detachable wheels, 700×80 tyres; £91/6.—P. J. Evans, 87-91, John Bright St. Sole agent for Birmingham and district. [2352

PLEASE Note, we can deliver the latest 6h.p. A.J.S. model from stock, price £91/16; also several other new machines from stock; please send for our lists.—The North Wales Motor Exchange, Chester St., Wrexham. [X9884

1916 4h.p. A.J.S, makers' No. 8,060, with A.J.S. coach sidecar, wind screen, luggage grid, lock-up toolbox, storm apron, spare wheel and new tyre, 2 Lucas lamp sets, Lucas horn, Watford trip speedometer, many spares, mechanically perfect, hardly used, brand new appearance.—Robinson's Garage, Green St., Cambridge. [2896



PEDAL CYCLES IN STOCK.

New Machines.

B.S.A., 23in., all-weather, Model 14, gent's	£12	17	6
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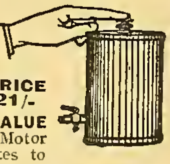

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REX, 1913, 6-8 h.p., 2-sp., 1916 Sidecar	**37 gns.**
ROVER, 1913, 3½ h.p., clutch, pedal start	**26 gns.**
RUDGE-MULTI, 1917, 3½ h.p., as new	**47 gns.**
RUDGE-MULTI, 1916, 3½ h.p., coach Sidecar, perfect	**52 gns.**
RUDGE-MULTI, 1914, 5-6 h.p., good order	**36 gns.**
RUDGE-MULTI, 1913, T.T., 3½ h.p., very fast	**27 gns.**
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SUN-J.A.P., 1916, 8 h.p., Sturmey countershaft, coach Sidecar	**69 gns.**
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TRIUMPH, 1914, T.T., clutch, red finish	**31 gns.**
TRIUMPH, 1913, 3-speed, perfect	**31 gns.**
TRIUMPH, 1914, 4 h.p., 3-speed	**36 gns.**
TRIUMPH, 1914, 4 h.p., 3-sp., coach Sidecar	**41 gns.**
ZENITH-GRADUA, 1914, 4 h.p.	**29 gns.**
ZENITH-GRADUA, 1913, 6-8 h.p., Bramble Sidecar	**37 gns.**
ZENITH-GRADUA, 1914, 6 h.p., clutch, kick-start, coach Sidecar	**41 gns.**
ZENITH-GRADUA, 1914, 8 h.p., countershaft, Sidecar	**46 gns.**
ZENITH-GRADUA, 1915, 8 h.p., T.T., 90 bore, red	**48 gns.**
ZENITH-GRADUA, 1915, 8 h.p., countershaft, coach Sidecar	**59 gns.**

In order to facilitate dealings with Country Clients, we invite such to take advantage of "The Motor Cycle" Deposit System, and we hope that those who have hesitated to deal from a distance wi'l now take advantage of a system which safeguards both sides.

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MATCHLESS 7-9h.p., 1915, countershaft 3-speed, f. engine, and kick start, model, B8, fitted with superior sporting sidecar, complete with tools and acc sories, superior condition, semi T.T. bars, M.A.G. gine; lowest £67/10, unprecedented bargain.—Seen Wauchope's, 9, Shoe Lane, London. [28

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MOTOSACOCHE, Ltd., Kenmont Works, Colle Park, Willesden Junction, N.W., have—

ONE 6h.p. Machine, with M.A.G. engine, 2-speed ge etc.; £77.

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AND Also the following second-hands:

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CATALOGUE will be sent on application. [28

1917 3½h.p. Twin Motosacoche, 2-speed Enfield ge and clutch, kick starter, Cowey speedomete under 300 miles, condition perfect throughout; can seen Palmer's Garage, High St., Tooting; £45, or ne offer.—Apply, Major Plowden, Lady Ridley's Hospit 10, Carlton House Terrace, London, S.W.1. [281

New Hudson.

NEW Hudson, 3½h.p., 3-speed, clutch, Bosch mag. £33/10; E.P. or exchange.—Service Co., 292, Hig Holborn, W.C.1. [X094

3½h.p. New Hudson, 1914 model, single gear; £15 property of an officer.—Seen at Wauchope's, Shoe Lane, London. [287

NEW Hudson Late 1914 3½h.p. Combination, 3-spee clutch, handle start, splendid condition, gears ju overhauled; £33/10.—Murgatroyd, Park Lane, Wak field, Yorkshire. [X087

New Imperial.

CROW Bros., Guildford.—New Imperial, latest 2½h.p 3½h.p., 6h.p. models in stock; also sound secon hands. [104

NEW Imperial, 1915, overhauled, new piston ring front lamp; a bargain, £22.—Gentry, Telephon Cottage, St. Osyth, Essex. [287

IMPERIAL-J.A.P., 2-speed, clutch model, £32/10 also new models in stock; E.P. or exchange.—Se vice Co., 292, High Holborn, W.C.1. [X094

NEW Imperial Motor Cycles, 2 speeds, clutch an kick starter, and lady's models in stock for im mediate delivery; trade supplied; no permits required —P. J. Evans, 91, John Bright St., Birmingham. [X065

1917 New Imperial-Jap, 2¾h.p., 2-speed, clutch, kic starter, speedometer, lamps, horn, tools, decom pressor, special saddle, only been 400 miles, perfect con dition; cost over £56, accept £40; approval willingly.—Box 1,590, c/o *The Motor Cycle.* [X089

Norton.

NORTON Latest Big 4 Military Model, all chain drive delivery from stock; £82.—Parker's, Bradshawgate Bolton. [X097

1916 T.T. Norton, B.S.A., fast machine, very littl used; offers.—Seen at Wauchope's, 9, Shoe Lane London. [288

1917 Big 4 Norton, latest all-chain, semi T.T. model little used, new condition throughout; 70 gns.—Box L5,417, c/o *The Motor Cycle.* [285

NORTON.—Big 4 Military Model, all-chain; als chain-cum-belt; £57/10; E.P. or exchange.—Se vice Co., 292, High Holborn, W.C.1. [X095

N.S.U.

N.S.U. 6h.p. Twin, T.T. racer, 2 speeds; 20 gns.; cycl accepted in part.—77, Acre Lane, S.W.2. [286

N.U.T.

PLUM of the Week; guaranteed.—Isle of Man T.T 2¾h.p. 1914 N.U.T., the identical machine whic was ridden by Carter, perfect condition, not ridde since 1916; cash price 29 gns.—E. Beresford, 5, Heato St., Brampton, Chesterfield. [294

O.K.

O.K. Juniors.—Call and inspect at the N.W. distric agent, F. J. Youngs, 2-3, The Parade, Kilburn. [031

O.K., 1915, 2-speed, speedometer, Stevens signal, pe fect order; £21.—Gentry, Telephone Cottage, S Osyth, Essex. [287

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More about Fuel.

WE have said before, and we offer no apology for saying again to our readers, that anything and everything likely to throw any light on the fuel question is a matter of primary importance to all motorists, and one that should before all things receive their gravest consideration. Consequently we would direct the attention of all motor cyclists to two extracts that appear in this issue, both bearing on the fuel question—though they are in very different tones.

The first of these extracts is from the motorists' arch-enemy, the *Daily Mail*, while the other is from a very different journal, the *Board of Trade Journal*, the first appearance of which in its new form we announced some few weeks ago in our columns. The *Daily Mail* extract consists of some remarks by Mr. Shrapnell-Smith—an important officer of the branch of the Board of Trade that deals with all petrol and allied matters—and the tenor of these remarks is to the effect that economy is even more important now than it has been for some time past, and it is also suggested that no alleviation of the situation is to be expected for some considerable time. Mr. Shrapnell-Smith is anything but an anti-motoring fanatic, and is also not the man to make wild and alarming statements without full and mature consideration. It is therefore probable that those motorists who are expecting an early relief from their present straitened position are doomed to further disappointment, and that the more energetic agitators among them are breaking their heads against a wall.

The far more important of our two extracts—that from the *Board of Trade Journal*—is also far more interesting, though unfortunately but little more hopeful, as far as the private motorist is concerned. The Ministry of Munitions, from whom the extract emanates, states that full development of home sources of fuel has been restricted by the perfectly legitimate though unfortunately conflicting claims of the various War Departments primarily in the sphere of labour. Consequently progress has naturally been much restricted.

Nevertheless, it is gratifying to learn that a Ministerial Department is fully alive to the possibilities of the case, and that as much as possible has been and is being done to forward these desirable ends. All that the motorist can do is to watch developments and take care that interest in the matter is never allowed to flag.

The Price of "The Motor Cycle."

OUR readers will have noticed that we have been compelled to raise the price of our journal, commencing with the first issue of next month. *The Motor Cycle* was first issued in 1903 at 2d., but it was soon reduced to 1d., which remained the price until last March, when war conditions made it necessary to revert to the old price. Now, as explained in the publishers' recent announcement, a further increase to 3d. has become necessary.

Owing to the drastic restrictions placed on the import of paper and paper making materials there is a serious shortage, and this, combined with the very great increase in the price of paper and the cost of production generally, has rendered this step imperative, the only alternative being a reduction in the size or quality of the journal. We feel sure that the majority of our readers would prefer to pay the increased price; in fact, we have received a number of letters to the effect that the writers would continue to take *The Motor Cycle* weekly even if the price were increased to 6d. To these we extend our best thanks. Our readers can assist the publishers in effecting an economy in paper by placing definite orders for the regular supply of *The Motor Cycle* either from our publishers or a newsagent, and by handing their copies, after perusal, to the Post Office authorities to forward to the troops, as is done in the case of the monthly magazines.

An index to the advertisements in this issue will be found on the page facing the back cover

OCCASIONAL COMMENTS

BY 'IXION'

The Perfect Terminal.

ONE of the criticisms passed on my suggestion that the magneto may eventually disappear from machines which carry accumulators for lighting work has been that it will involve a return to the bad old days when electrical cables snapped off at their connections with sickening regularity at the rate of one a mile. Has anybody noticed why our cables never snap off nowadays? Simply because the modern type of connection, whether to a single-cylinder magneto or a twelve-cylinder lighting, starting, and ignition set, supports the insulation as well as the internal wire. In the old days the thin woven flexible wire carried the entire weight of the cable, which was seldom supported in clips. To-day every terminal in the electrical system of any decent machine is so designed that a stiff piece of metal takes the weight and the thin internal wire has nothing to do beyond effecting electrical contact.

Another Crank.

I AM not the only lunatic on our staff, you know. One of our sister papers boasts a writer who is nearly as dotty as I am. He has been an awful bore for the last week on the subject of radial engines, for which he has conceived an absurd enthusiasm with a view to light cars, which are as much his King Charles' head as flat twins are mine. He has apparently smuggled himself into some aero shop, and seen a radial engine which weighs about 2 oz. per h.p., and then he went home and dreamed of a 2 cwt. light car, with a deck which was wholly available for passengers and luggage, the engine being gummed on the front panel, and being little thicker than a postage stamp.

Why Aluminium?

FROM these Utopian dreams and philosophisings, let us descend to hard facts with a pancake landing which will concertina our undercarriage. Will some technical expert tell us why motor cycle gear boxes are usually made of aluminium? The official answer is because aluminium is light. The true answer is because Adam was descended from a sheep. Just think. The casing portion of the average motor cycle gear box consists of about two cubic millimetres of metal: whether you make it of *papier mâché* or lead affects the gross weight of the machine just about as intimately as whether you shave before or after your ride. No. Motor cycle gear boxes have aluminium casings because car gears are usually enclosed in aluminium: and, where cars are concerned, the gross amount of metal may justify the selection of the metal. This is the sole reason why motor cycle gear boxes are of aluminium. Incidentally, it is a rotten bad metal for the purpose. Thrice during a recent twelvemonth the businesslike hum of a certain gear box which then disgraced my garage was augmented by a more soprano-like and strident hum, indicating that the ball bearing housings had worked loose in the light plates of aluminium, wherein their optimistic designer had hoped they would find an eternal resting place. I have owned one gear box which has never given me any trouble: and its casing is of phosphor bronze. Phosphor bronze, let me add, is cheaper than aluminium: quite as easy to work: infinitesimally heavier in such small quantities: and a million times more satisfactory.

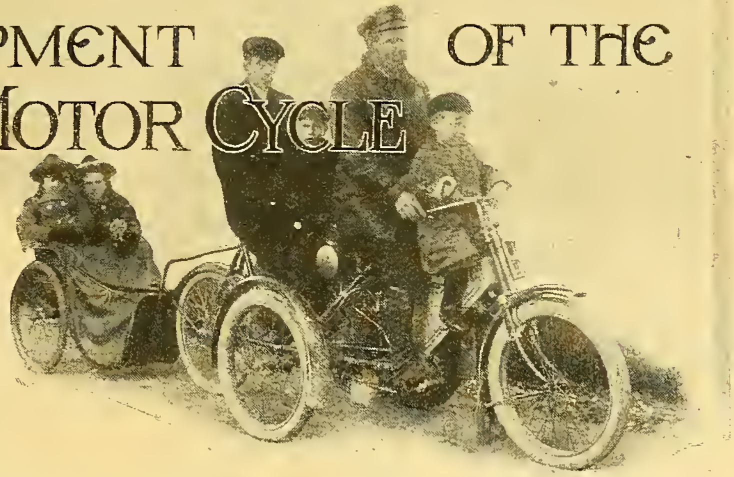
Some Questions for Mr. Aston.

MR. ASTON'S article on altitude stimulated a great deal of discussion, and I will ask him to tackle a topic into which he betrayed a number of us who possess more enthusiasm than information. The company started with "ceiling," and finally wandered into speculations about flying through space to visit the moon and the more adjacent planets. Opinions on the subject were divided, especially when points relating to gravity were superadded to the aerodynamics of space. Finally, the Ulstermen asserted that flying through space was as much a mechanical impossibility as perpetual motion, whilst the Nationalists stood irreconcilably by a theory that, given a compressed air supply for the carburetter, an oxygen apparatus for the foolhardy pilot, and some form of buoyancy for the supporting surfaces, the Cuthberts of the next great war would probably hie away to the moon with sufficient tabloid provisions for a prolonged sojourn. I purposely issue my invitation to Mr. Aston through this column, in order that readers may have a week or two in which to puzzle their brains on the topic before he pontificates upon it.

The Edison Accumulator.

A CORRESPONDENT suggests that an electric lighting set for solo machines could easily be furnished as soon as peace returns if makers would adopt the Edison accumulator. I have never owned an Edison, but he implies that you can drop it off the top of the Eiffel Tower, or squash it under a steam hammer, or short it by leaving a tyre lever across its terminals all night, and it comes up smiling for the next round. I heard some of these Edison yarns a year or two back, and wrote to the concessionnaires for particulars, picturing myself writing an article for *The Motor Cycle*, which the Editor would print in ruby capitals as a boon and a blessing to our community. The Edison reply put the lid on my rosy dreams, for they wanted £11, I think it was, for the very modest size of accumulator which I then required. However, it by no means follows that we may not soon get a good solo set. One or two dynamos of compact dimensions are already thoroughly reliable, *e.g.*, any touring motor cycle could readily accommodate the type of Lucas dynamo which figures on the Morris-Cowley car, and I know that Messrs. Lucas have been working hard to evolve a sound accumulator for the purpose.

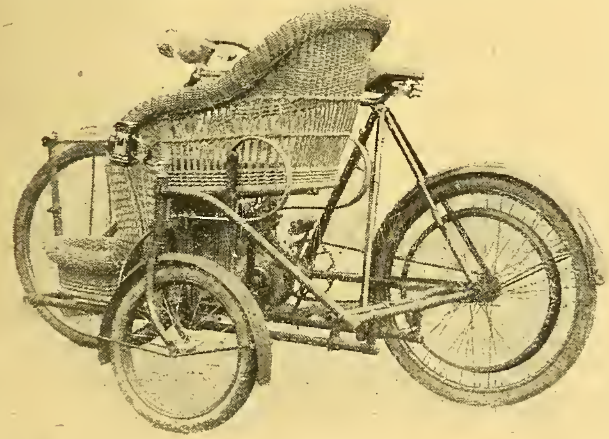
THE DEVELOPMENT OF THE PASSENGER MOTOR CYCLE



THE DEVELOPMENT OF THE SIDECAR.

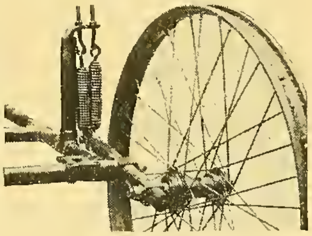
OUR previous review practically covered what may be called the period of the genesis of the passenger motor cycle, and although at the time it was not fully recognised, there is no doubt that by the end of 1905 the final triumph of the sidecar was assured. From 1906 to the present time very few radical changes had been introduced into the practice of sidecar construction, and indeed we may say that with one single exception nothing of even a mildly revolutionary nature has been introduced since the introduction of the flexible sidecar in 1903.

This exception was the castor wheel sidecar, which made its appearance on the market in 1905. As the name suggests, the castor wheel was a wheel that trailed in a fork from a head similar to the steering head of a cycle, and this construction is made perfectly clear from the accompanying illustration of a castor wheel sidecar made by Messrs. Mills and Fulford in 1905. Of course, in later years, the actual method of fixing the trailing wheel was considerably altered, but the principle remained the same. There is no doubt that for cornering the castor wheel was an enormous advantage, but like the flexible sidecar the castor wheel exercised little check on the skidding of the cycle; also while the castor wheel sidecar remained vertical with the machine at rest, it was rather difficult to handle, because as soon as the machine was pushed backwards the wheel would swing round and consequently would not form a fixed pivot. Those readers who have noticed our remarks on reversing with the gasbag attached will readily perceive what is meant.



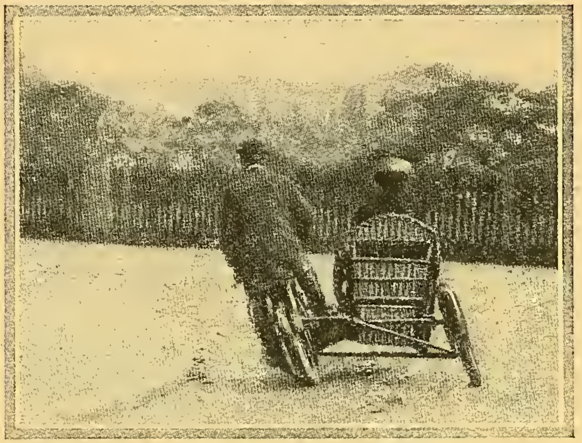
The castor wheel sidecar. This type was very pleasant to drive, but was, like the flexible, liable to skid, and it also had the drawback that it was awkward to handle in the garage.

The introduction of sprung sidecar wheels took place about 1908 and promised to bear great fruits, but like many other ideas that started very well they are now considered a somewhat questionable recommendation. Breaking away a little from our chronological order, we may refer readers to an illustration reproduced in *The Motor Cycle* of September 30th, 1908, showing an excellent system of sidecar wheel springing. This idea was purchased by Messrs. Chater Lea and used by them as late as 1913.



Springing the sidecar wheel. Attempts in this direction have never met with unqualified success, but this, one of the earliest efforts, gave complete satisfaction on the Chater-Lea sidecar. Without question the subject of sidecar chassis springing will be one to receive very full attention after the war

In 1906 had been illustrated a two-wheeled sidecar called the Auto Phaeton, and while this particular vehicle does not appear to have enjoyed any great measure of success, it was followed in 1908 by the Lowen sidecar, which was also a two-wheeled sidecar, and is shown attached to a Matchless motor cycle. In fact, the year 1908 was comparatively prolific in the production of passenger vehicles, and in December of this year was illustrated in *The Motor Cycle* a four-cylinder 20 h.p. tricar designed much on the lines of the modern Morgan, but of course very much larger. In this month also an excellent device known as Warr's passenger motor cycle was put on the market. This, as may be seen from the illustration, was a type of back car, but contained all told only three wheels, the rear wheel of the motor cycle being entirely removed, and a countershaft fitted in a position somewhere near that usually occupied by the rear hub, and the drive being taken thence to one of the rear wheels by a second chain. Like many other promising devices, Warr's passenger motor cycle did not have a very long life.



The combined rigid and flexible sidecar, a design full of merit, which was fated to a short life. This sidecar could be made either flexible or rigid at will, and the change could be made by the driver while travelling.

In 1909, as a kind of reminder that the flexible sidecar still had something to say for itself, although it had considerably declined in popularity, a most ingenious and excellent device was put on the market in the shape of the Appleby combined flexible and rigid sidecar. The illustration reproduced of a motor cycle and this sidecar chassis attached shows that the sidecar wheel leant over with the motor cycle, the distance between the wheels being invariable, but the main feature about it, which unfortunately is not shown in the illustration, is that the machine could be locked in an upright position by the simple movement of a small lever. Consequently, when the machine was stationary, movement of this lever would cause it to remain upright, and also when riding on treacherous roads the combination could be converted into the rigid type, and at a moment's notice rendered immune from skidding.

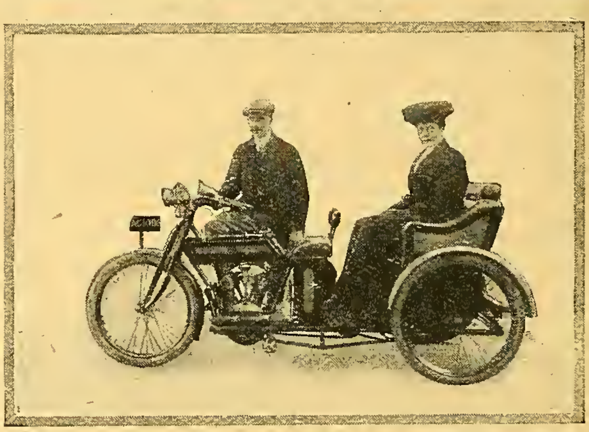
Sidecar on Right of Machine.

This illustration is also interesting as depicting the sidecar shown on the right-hand side of the motor cycle. It was, indeed, not until 1911 or 1912 that the fitting of the sidecar to the left-hand of the machine became practically universal, and throughout 1910 discussions were frequent in *The Motor Cycle* as to which was the better side for attaching the sidecar. In this year appeared a device that, like so many others to which we have already referred, did not meet with the success it seemed to deserve. This was a folding sidecar. Several of these arrangements have been put on the market, and the working of this particular example is made perfectly clear from the illustration. The advantages of a folding sidecar are, of course, too obvious to need elaboration—as, for instance, when circumstances necessitate taking the machine through a narrow gateway at frequent intervals.

The First Morgan.

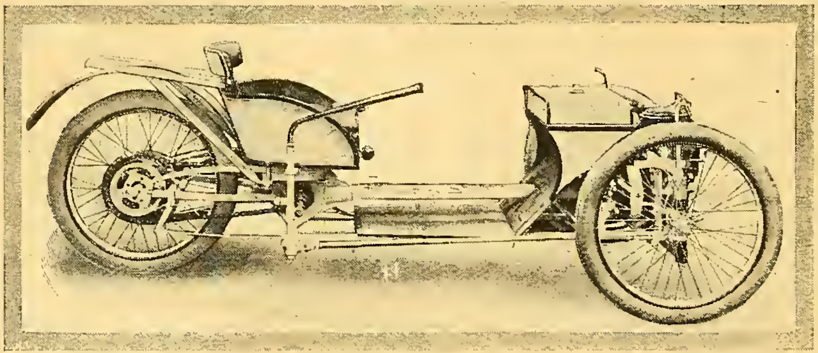
It will be noticed that the Pioneer Morgan was a very different vehicle from that now being manufactured, and it will also be seen that the power plant consisted of a single-cylinder engine.

If there is one feature about all these early passenger arrangements that more than anything else strikes a present day observer it is the exposed position of the passenger in practically every instance. The Lowen sidecar certainly was equipped with a hood, but the "dash"—if it may be called such—was so low as to be practically non-existent, and many observers in 1911 had come to the conclusion that if the sidecar were to develop any further two radical improvements were necessary. The first of these was the provision of better weather protection for the passenger, and the second was the provision of more permanent attachment between the motor cycle and sidecar; in fact, when the war broke out we had reached the stage when motor cycle and sidecar were turned out as a fixed combination without any intention in the maker's mind that they should be separated, except on very rare occasions.



A promising three-wheeled design that appeared on the roads in 1908. Many devices embodying less well-tried principles and of less pleasing appearance have been placed on the market since this machine made its début.

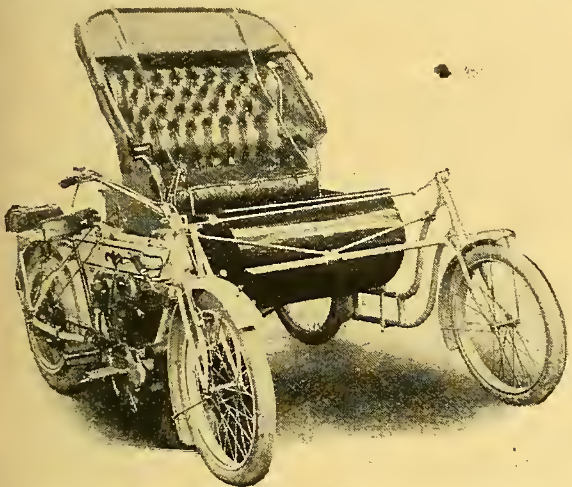
The first machine to illustrate either of these tendencies to any marked degree also illustrates them both, and may, indeed, be regarded from many



The first Morgan. There is no need to emphasise the difference between this, the first, and the latest products of the now famous Malvern firm.

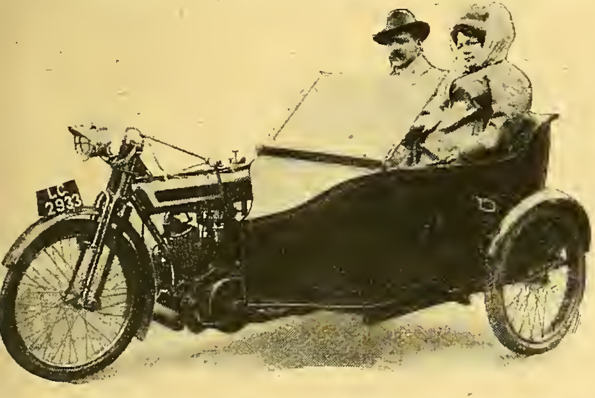
The Development of the Passenger Motor Cycle.—

points of view as well ahead of practice existing even now. This machine was first known as the T.A.C., later as the T.M.C. and Ogden, and our illustration of this combination, reproduced from *The Motor Cycle* of September, 1912, shows what an elegant and up-to-date appearance the whole provided



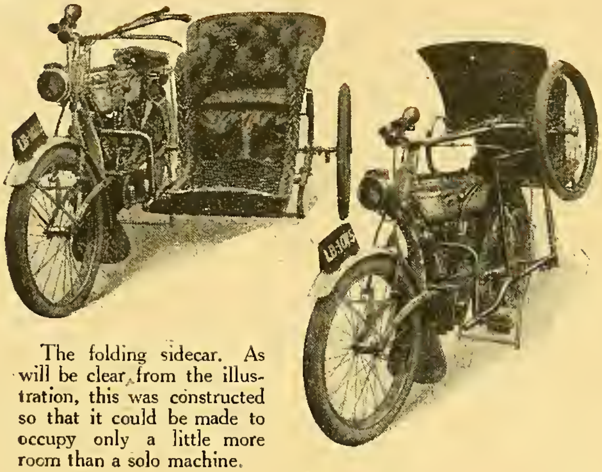
The Lowen two-wheeled sidecar. This type of sidecar made the combination into a four-wheeled vehicle and so liable to the car tax. It had several advantages, but this taxation question apparently outweighed them all in the mind of the public, for although complaints as to the merits of the system were extremely rare, its success was comparatively short lived.

It will be seen that the power plant consisted of a four-cylinder water-cooled engine with shaft transmission, and clutch and gear box arranged after car practice, while the sidecar as well as the motor cycle seat appear the very picture of comfort. Whether this machine will return after the war remains to be seen. As our articles for some time past have shown, there is an enormous class of riders who want a machine that can be used for solo work occasionally, although primarily intended for pulling a sidecar. The T.M.C. was not an ideal solo mount, for which purpose the steering renders it almost impossible, although we can see little improvement to suggest in its general design as a passenger motor cycle.



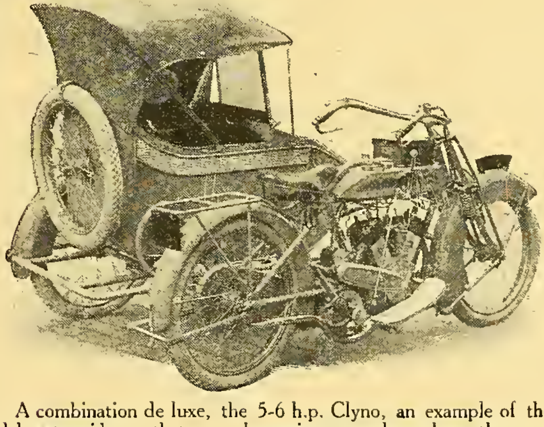
An example of the side by side sidecar which was driven from the sidecar seat It is quite possible that this will be a popular post-war type.

The general tendency towards elegance in those few years in which the sidecar enjoyed unrestricted development is shown in the last illustration—one of the 1916 model Clyno combination.



The folding sidecar. As will be clear from the illustration, this was constructed so that it could be made to occupy only a little more room than a solo machine.

The question of a sidecar to carry two passengers is one that has often come in for consideration. Personally, we think that the future of the two-seater sidecar is a very precarious one, but, of course, as has been proved time and time again, prophecy in such a matter is an extremely unsatisfactory undertaking. For this reason it is difficult and unwise to attempt to indicate with any pretence at authority along what lines the future development of the sidecar is likely to proceed, but most of our readers will be familiar with double-seated sidecars in which the driver and passenger sit side by side, the cycle itself having no passenger. Such machines have appeared on the market since 1913. The Scott Sociable is, perhaps, the highest development of this type, and, of course, except in casual appearance, really has nothing in common with the sidecar attached to the motor cycle. But the pioneer is, we believe, the machine illustrated herewith—the H.S.M. sidecar. In our opinion this type of machine will attain a fair measure of popularity after the war, and we may remind our readers that the Seal—a device of this nature made in Manchester—did attain a certain measure of success, while such a prominent firm as A. J. Stevens and Co., Ltd., had also turned their attention to a similar device.



A combination de luxe, the 5-6 h.p. Clyno, an example of the elaborate sidecar that was becoming popular when the war broke out.

HONI SOIT QUI MAL Y PENSE
ROYAL ENGINEERS

MILITARY NOTES.

THE M.T., A.S.C., AGAIN: A TRIBUTE.

AN APPEAL TO MOTORISTS.

WE have already referred to the excellent work of the Motor Transport Volunteers in transporting leave men across London at night time, and it gives us pleasure to publish another appeal for drivers. General Sir Horace Smith-Dorrien has stated that no form of voluntary war service is of greater value to the country, and the Earl of Chesterfield and Maj. C. R. Freemantle appeal to motorists to offer their services at 31, Walbrook, E.C.4. The hours of duty are from 11.30 p.m. to 6 a.m. one night per week, and petrol and tuition are provided.

* * *

THE M.T., A.S.C. AGAIN.

A RATHER belated letter on the subject recently discussed on this page, on the dangers of the M.T., A.S.C., comes from Cpl. R. N. Richardson, now in Salonica. He speaks from long experience, and we give his letter in full:

"Having read J. W. Parsons's idea of the work of the M.T., A.S.C., which appeared in *The Motor Cycle* on September 20th, 1917, I think his letter was very unfair. I cannot help but answer it. One would think he had never seen active service if he had not said so, and if he has he cannot have had much experience.

"I should like to ask him these few questions:

"Who drive the Tanks, the ambulances, move the heavy guns, take up the food and ammunition, and this while under shell fire half their time?

"Who were the last to leave their post at Mons, and when, where, and how did the A.S.C. receive the Loyal Wreath which they still wear on their cap badge to-day?

"Now we will take the D.R. who rides with the artillery and who is at times in more danger than the infantry. Mind you, a D.R. does not always complete his journey on his cycle—more often than not he has to complete it on a mule and on foot. And not only that, he is under shell fire and rifle fire very often.

"We have not only that to put up with, but we have also the troubles of the road, where there are roads, and where there are no roads we have to travel through ravines, rivers, mountains, and I can say in the winter we have something to go through. And a D.R. always carries out his duty, no matter how bad the weather may be.

"I have had two years' active service myself as a D.R., and I know what it is from experience in France, Belgium, Serbia, and other fronts in the Balkans."

* * *

HONOUR FOR SGT. HEALY.

SGT. J. HEALY, R.E., a Cork motor cyclist, who is at present serving as a despatch rider in Dublin, after a period of service abroad, was presented on Tuesday, January 8th, with the certificate of the Royal Humane Society as a recognition of his gallant act in saving from drowning the life of a woman who jumped into the Liffey. Healy saw service at the Dardanelles as a D.R., and was invalided home. For gallantry during the Dublin rebellion he was promoted to sergeant. He rode a B.S.A. in the 1914 T.T.

IN THE LAND OF SAND AND FLIES.
Members of the Army Signal Corps in Mesopotamia. All the mounts are Douglases.

A TRIBUTE.

FROM a communication we have received from Pte. J. W. Dickinson, M.T., A.S.C., we have taken the following extract: "I have been rather amused at some of the discussions regarding the Triumph. Having been a regular reader of your journal since its birth, and having had sixteen years' experience, riding everything from the 1¼ h.p. Motosacoche to the 7-9 h.p. road-eaters, I must say that with the exception of a stronger top tube, buffer spring, and cover for gear quadrant, the 'trusty Triumph' still can hold its own with anything for work in France. Granted its speed is not much above 45 m.p.h., but I am sure, if I had the same machine in private life and made a few slight alterations, another 10 m.p.h. could be added for work on our roads. Reliability is more important than speed in France. Simplicity, strength of transmission, and accessibility are the secret of the success of the trusty Triumph; it has also shone as a mud-slogger. There is no need for T.T. models near the line, and a good many other places; therefore, why crave for a speed mount? My only interest in the machine mentioned is that I always considered it the best single, and have possessed each model from the time when the manufacturers first made their own engine, in 1905, to 1914."

Lt. Victor Greaves, who lost his life during the great struggle for Cambrai. He was a keen motor cyclist, and a member of the Chesterfield Motor Cycle Club.

* * *

24 HOURS' CONTINUOUS RIDING.

WE received a message the other day from W. H. Elce, who is now despatch riding in Palestine. Elce is one of the many motor cyclists we helped to enlist in the R.E. Signal Service. In writing to his wife recently he stated that he had done twenty-four hours' riding without a break in the country round Jerusalem. He wished to be remembered to his former co-competitors in the T.T. We were very glad indeed to hear that he was still safe and sound. He also writes most enthusiastically regarding the behaviour of his countershaft Triumph.

* * *

AN AMERICAN COATALEN.

MR. FRED. S. DUESENBERG, the American designer and builder of many successful car, boat, and aeroplane engines, started his engineering career as a manufacturer of motor cycle engines. It was a Duesenberg engine which was fitted in the famous racing motor boat *Disturber IV.*, and similar engines, we understand, are fitted in many of the submarine chasers used by the Allies.

B.S.A Popularity

and why–

B.S.A. CATALOGUE
FREE ON REQUEST

LONG SERVICE.

There is no necessity to quote exceptional cases of B.S.A. longevity, there are thousands of B.S.A. riders everywhere who, from personal experience, can testify to the remarkably long service which B.S.A. machines give. Year after year B.S.A. Motor Bicycles are giving invaluable service, frequently under the most arduous conditions, and with unfailing reliability. Freedom from worry and a saving of expense are two important advantages which have been largely responsible for the great popularity of B.S.A. machines.

B.S.A
MOTOR BICYCLES

For Solo *& Sidecar*

THE BIRMINGHAM SMALL ARMS COMPANY LTD.,
47, Small Heath, BIRMINGHAM.

ASSOCIATION OF BRITISH MOTOR AND ALLIED MANUFACTURERS

B·L·I·C

THE BRITISH LIGHTING & IGNITION Co LTD

MODERN WARFARE is the supreme test of all mechanism—whatever the circumstances, it *must not* fail. And under these strenuous conditions the "B.L.I.C." Magneto has fully demonstrated its unrivalled supremacy.

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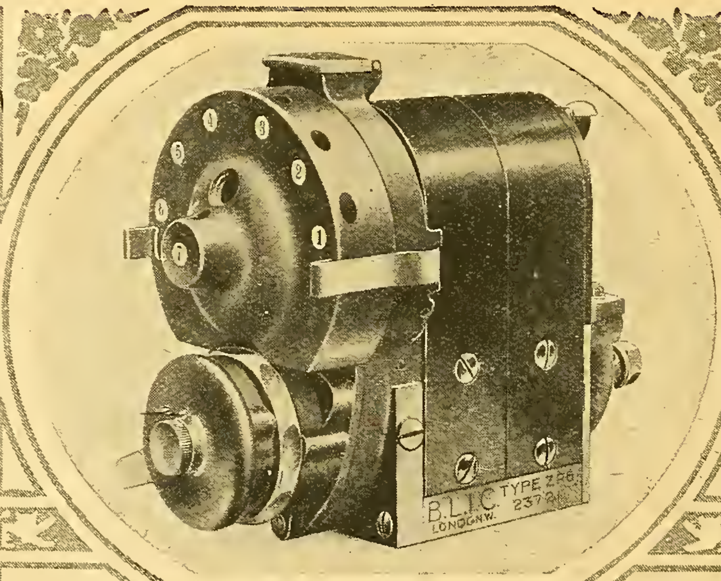


OVERSEAS SECTION.

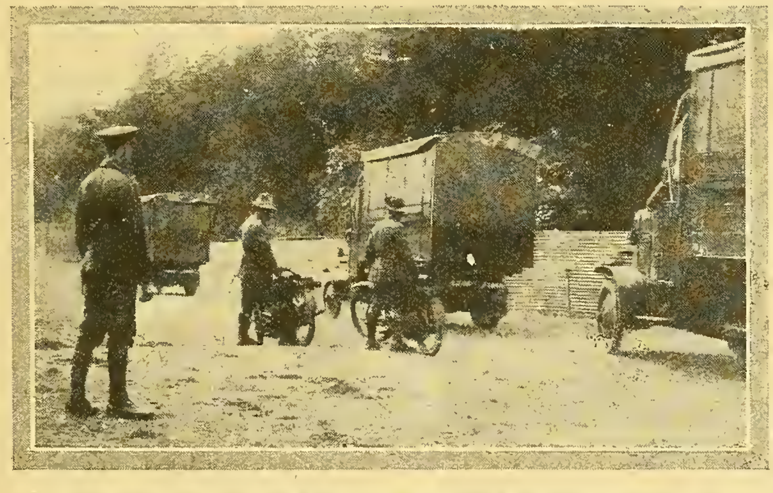
The Expressed Opinion of an Overseas Rider, which may or may not be Generally Approved.

Some Notes on Overseas Models. An Australian reader, Mr. Hamilton Grapes, A.M.I.A.E., adviser on motor matters to the G.P.O., Wellington, N.Z., sends us some notes regarding the needs of Overseas riders in motor cycle design. He infers that the small solo machine would enjoy but a limited demand, and would mainly be used for work in the towns. The two-speed clutch machine of medium weight, preferably the opposed twin, is growing in popularity, and should have an engine of 270 c.c. to 350 c.c., and be equipped with 26in. × 2½in. tyres.

It is most important that such machines should be economical in petrol and oil, and should be capable of obtaining the greatest possible mileage before it is necessary to lay them up for overhaul. Such machines are not required for actual touring purposes. For the solo machine for touring purposes our correspondent suggests a cubical capacity between the above and the 1,000 c.c. sidecar machine. The latter, he states, is not adapted to touring purposes in the hands of the ordinary rider, owing to its excessive weight and uncontrollability.

He emphasises that the solo machine should possess lightness and a high efficiency power unit, and he states that there exists a strong objection in Australia on the part of the buying public to the heavy weight machine for solo work.

A three-speed gear box and clutch with ample friction surface are most necessary. The delicacy of clutch adjustment, as arranged for on American machines, has made, Mr. Hamilton tells us, the Indian greatly appreciated. A spring frame is desirable, if possible, without too many small pivoted bearings, which the average rider will not take the necessary care to lubricate.


Australians with their travelling workshops passing through a military centre in England. Repairs of all kinds are undertaken by these travelling depots, which have proved highly valuable.

The saddle position and the centre of gravity of the machine should be low, and the saddle should be arranged so that the rider sits *in* instead of *on* the machine, and well forward so as to ensure immunity from rear wheel shocks. The rearward and high saddle positions on present motor cycles are considered by many users Overseas as objectionable, and Mr. Grapes specially emphasises the importance of the fact that spring frame arrangements must possess great lateral rigidity, while an electric lighting equipment is desirable if compatible with reasonable weight. He also lays great stress upon the necessity of the machine having a pleasing appearance.

* * *

Ground Clearance, Mudguarding, and Frame Design. Our correspondent then goes on to raise an interesting point. We have always had it dinned into our ears that motor cycles for Overseas use should possess a high ground clearance. This, he points out, is incompatible with the essential low centre of gravity, and it is even therefore more mythical than real, except in a few notable cases in which the clearance is too low for use. On Dominion highways a clearance of 4½-5in. is considered to be ample for prevailing conditions, owing to the rapid improvement of the roads.

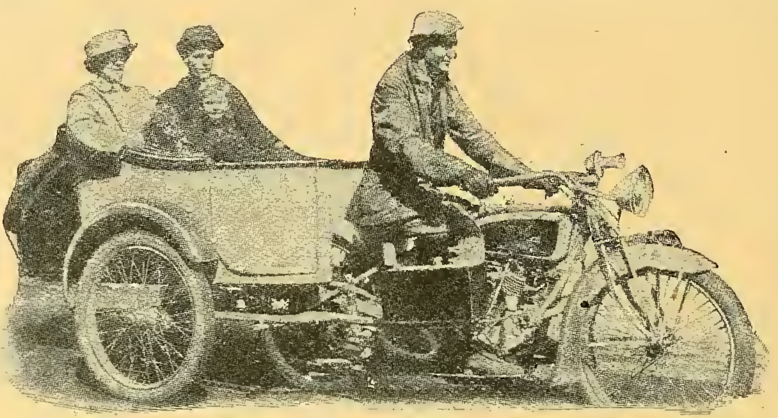
If rear springing is not adopted, 28in. × 3in. tyres are essential. Abnormal mudguard clearances have not been found effective in preventing clogging when weather conditions are severe, and these, he goes on to say, mitigate against the low saddle position. A clearance of about 1½in. only is most suitable, and anything over this serves no useful purpose. It is especially important that Overseas machines should have a petrol capacity of 2½ gallons, and carry half a gallon of oil.

Folding footboards should be fitted instead of the rigid ones to be found on most English machines. Our correspondent also suggests that an easily detachable

Overseas Section.—

shield, fixed to the down front tube and attached to each footboard, would be most desirable for wet weather, and would be much appreciated

It is interesting to note that Overseas the value of the automatic carburetter is being realised to an increasing extent. The Schebler carburetter, fitted to so many American machines, is proving highly satisfactory, and gives excellent results even with the heavy grade fuels now in use. As regards controls, the twist grip pattern, in combination with Bowden control, is considered to be ideal.


A type of passenger motor cycle becoming increasingly popular in the States. Although it is capable of carrying a big load more comfortably than a sidecar, British motor cyclists have not as yet shown any great enthusiasm for it. Even so it would be rash to prophesy that in the near future it will not be used in this country.

It is pointed out that the main weakness of pre-war engines was the connecting rod bearings, the big end surfaces of which were inadequate, while the removal of cylinders should be facilitated by other means than the high tank bar clearance. The adoption of a method such as a detachable tank bar, as on the old Humber machine, or an off-set bar like the Zenith, would be highly appreciated, and would incidentally facilitate low-set design.

Another interesting point is that our correspondent speaks with great enthusiasm concerning mechanical lubrication on motor cycle engines, as many drivers do not give their engines enough oil when using the hand pump owing to lack of necessary knowledge. Much oil is needed owing to the excessive heat in the Dominions during the summer and the excess of low gear work and slow running.

Our informant concludes by saying, "Finally, I am firmly of the opinion that if these desiderata were incorporated in the design of the best British machines, the British manufacturers would be able to recapture and hold the market in the Dominion of New Zealand, as well as in Australia.

New Zealanders for Motor Cycle Sections. A New Zealand motorist who joined the Army with the object of being a despatch rider (presumably in the A.S.C.) was, owing to too high a medical category, enlisted in the infantry. He writes to us, "I would like to point out the utter futility on the part of intending Overseas motorists of anticipating obtaining a transfer to the M.T. Corps should they leave their respective countries for active service at the Front. The conditions which have to be complied with render the intending motor despatch rider's transfer a practical impossibility. Publication of matter relating to this particular subject will undoubtedly avoid a great many disappointments in the future should the war continue for much longer; and, as I have a great number of personal acquaintances in New Zealand who are prominent motorists and are readers of your valuable journal, and who anticipate joining up in the M.T. section, this may be a means of advising them on the matter, and therefore minimise the chances of their being disappointed in their desires."

Our correspondent seems to be unaware of the fact that men are now only accepted for the M.T. who are below Class A, or who are in a comparatively low medical category. Despatch riders, however, for the Royal Engineers (Signal Section) and for the Royal Flying Corps must be Class A men, but, unless there are vacancies in these particular corps, and unless recruits have special knowledge and experience of motor cycles which would qualify them to become Army motor cyclists, they will be placed probably in the infantry. Transfers from one corps to another are not looked upon with favour by the Army authorities.

A Selection of Letters from Readers scattered all over the World.

Softening the Drive.

Mr. D. Sharp, of Pucklechurch, Bristol, writes: "In the 'Overseas Section' of December 27th issue I observe that Mr. William Coultas complains of breaking spokes on his 4¼ h.p. B.S.A., chain drive. Let him extract the compression and depression shock springs contained in the cush drive and insert rubber buffers. If he cannot obtain rubber of sufficient thickness, etc., he can extemporise with strips cut from an old tyre. The rubber improves the 'drive' and gives smoother running. Since scrapping the B.S.A. springs and using rubber cushions I have not broken a single spoke in my back wheel. Before doing so I broke spokes constantly."

Roads in N.S.W.

Colin A. Cruwys writes to us as follows *re* road conditions and suitable machines in his part of the country: "In your edition of October 25th, 1917, I noticed two photographs headed 'Roads in Australia,' and a statement to the effect that they are a sample of the roads to be found near Bankstown or Liverpool, N.S.W. Any ordinary person reading Mr. Sydney Turnbull's letter would take it for granted, judging from the photographs, that they were the normal road conditions. That is not so. I have lived around that district for the last twenty-two years, and I have not yet seen any part of the road between Sydney or Liverpool in such a condition, unless it were on some back bush track. I take it for granted that the photographs are part of the main road, and I think that Mr. Turnbull has slightly exaggerated things.

"About English machines not being on the Australian market, I think he is wrong; there are very few English cycles that are not on the Australian market. I do not agree with him about American machines, which are not as heavy as the average English machine, and I do not think that they suit our road conditions. I rode a Triumph for some years, and encountered no trouble. I agree with him

Overseas Section.—

about the mudguards. They do need more clearance. I have met with mudguard trouble both in England and France, so that it does not apply only to Australia.

"I am now with the Australian Expeditionary Forces as a cyclist. I think that any other ex-Sydney cyclist who sees the photographs will agree with me."

British Machines in the Colonies.

MR. R. G. FOOT, Blairmore, Alberta, Canada: "I value *The Motor Cycle* highly, and it has been especially interesting since the views of Overseas subscribers were placed in it, as it gives one the feeling that many at home are waking up to the vast undeveloped possibilities of the Colonies. As most of the men put it, we would ride British machines, only we cannot get them; therefore we are glad to get American, which control the market, and are built for Colonial conditions."

Which Type of Control?

MR. W. B. SMITHSON, of Toronto City, writes with reference to a recent controversy: "I have been much interested in the discussion on the most desirable types of controls—outside levers or inverted. If we are to have Bowden wires, then for goodness sake let us have them *outside*, so that we can get at them to oil the inside cables, easily renew them if necessary, and take out the handle-bars (which is often necessary) without unnecessary labour. But—why have wires at all? They rust, break, trap, and are a source of endless trouble. What has become of the old Vindec Special rod control? Could not the same idea, in the light of modern manufacture, be effectively applied? I abominate twist grip controls, except for the contact breaker, as they are insufficiently delicate for carburetter manipulation, but twisting rods might easily be operated by handle-bar levers."

A Reply to Mr. Warne.

"W.G.," with reference to Canadian business, writes: "Mr. W. R. Warne, in his letter published in the Overseas Number for October 25th, 1917, shows a lack of knowledge regarding the difficulties that agents for English motor cycles are up against in Canada, and especially at the present time when 'spares' cannot be procured, not to mention machines. I have been in Toronto selling English goods for thirteen years, viz., Rex, Brown, and Triumph. Mr. Warne states that 'the Americans monopolise the whole business, that their machines are running about in thousands.' Last year I rode over 4,500 miles on a 4 h.p. Triumph, S.A. hub gear, and a Junior, and rode more or less almost every day, including most of the winter. My rides vary from ten to 100 miles. In a ride of fifty miles I do not meet half a dozen American machines. Mr. Warne remarks about the Toronto police riding Hendersons, but he does not give the reason, viz., that they could not get Triumphs because the makers could not supply.

"Another statement Mr. Warne makes is that Triumphs are looked upon as only fit for city use. If he will take his memory back a few years to the three days' reliability run held by the Toronto Motor Cycle Club he may remember that some sixty or seventy riders started—the distance about 250 miles. Two Triumphs only entered, and they won the first and second prizes—that is, the solo and sidecar events. No other machine made full marks.

"As Mr. Warne states, 'the man who owns an Old Country machine has to struggle by taking care of his own requirements as best he can.' I know a place in Toronto to-day where there are over 500 dollars worth of parts for Triumphs. Mr. Warne gives a very bad impression about the English machines, so he swears by the American article. If this is warrantable, why does Mr. Warne advertise in a Toronto paper the following: 'Wanted, Triumph motor cycle, three-speed model preferred, must be in perfect mechanical condition.—State full particulars, price, date of model, equipment, etc., to WARNE' Then follows Mr. Warne's Toronto address.

"There are over 130 Triumphs in the city, and I think if he will read page 426 in *The Motor Cycle* for November 1st, 1917, he will change his idea of the Triumph only being fit for city use. Where the 8 h.p. twin scores is its ability to lose 2 h.p. and still get through; but the Triumph rider, if he loses 1 h.p., is up against it under severe conditions. But, put the latter machine into a man's hands who can keep it in tune, and it will show its back number to the 'twin' every time, especially if the owner of the 'twin' has not the skill to look after his machine.

"When the English makers can put on the Canadian market a machine as reliable and good as they manufacture at present at a price that the American machine sells for here then they will have a chance of a good market, and there will be plenty of agents to push the goods. I have an idea that some of the English makers have lost money in their attempts to foster Canadian trade."

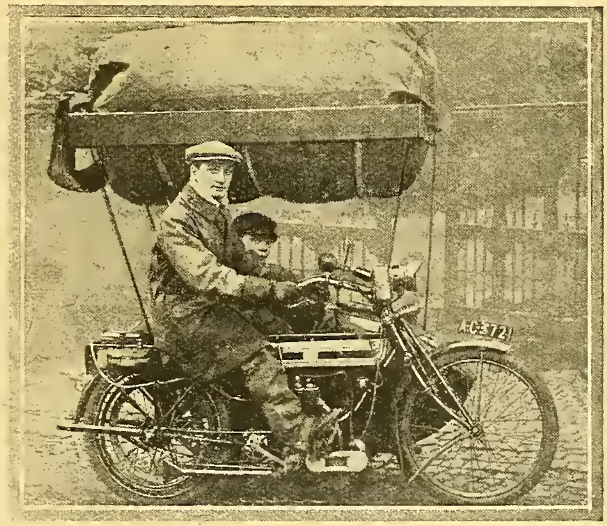
Cheaper Machines Wanted.

MR. THOMAS H. BLAKE, of Cottesloe, West Australia, writes: "I thoroughly enjoy reading your excellent journal. The letters *re* trade between Australia and England are very interesting. Unfortunately, owing to the war, the Overseas trade is passing into other hands—temporarily only I hope. If the English trade would produce a cheaper machine the market would increase enormously, but we must have spring frame machines for Australian roads."

Some Remarks from the Cape on British Machines for Overseas.

MR. HATTON writes us from Cape Town on machines for his country as follows: "Personally, I think there are only two considerations in the design of a colonial machine which can be given positions of primary importance. These are weight and accessibility. So long as the weight is reasonable I would prefer a 6 h.p. twin to a 3 h.p. single, but if I have to gain the extra power by an acquisition of extra weight, then I will go without the power and be content with a really good 2 h.p. single-cylinder lightweight. It is only a question of gearing when all is said and done, and a suitably geared 2 h.p. will follow the big twin anywhere, though the converse is not by any means true. Get some of your heavyweight enthusiasts to get stuck in real sand, and then ask them if they really think the heavyweight a better all-round machine than the lightweight.

"Accessibility has been so laboured and so discussed that I feel almost ashamed to bring it forward again, but really, as long as English manufacturers are proud of their pig-headed conceit, it seems to me the only method likely to make them consider the advisability of a change in tone. If they will not change their methods, perhaps they will also object to changing their turnover, and so will not mind losing 'the dibs' as a consequence. Once again I say 'Accessibility,' and, if anyone does not know what I mean, let him turn to the making of matches or margarine; he is certainly not intended for a motor cycle manufacturer."



A 4 h.p. Triumph outfit fitted with a Robin Hood gas holder, the property of V. G. Mutton, of 44, Rectory Road, Redditch. It will be noticed that the gas holder rests on webbing suspended from a wooden tray, which is supported by four steel supports from the sidecar chassis. It is possible to fill the bag from a 2in. gas main in one minute and a half, obtaining sufficient gas to run with sidecar and passenger approximately sixteen miles.

TIMES TO LIGHT LAMPS.

	Greenwich Time.
Jan. 31st	5.14 p.m.
Feb. 2nd	5.18 ,,
,, 4th	5.22 ,,
,, 6th	5.26 ,,

Women Drivers for Government Motors.

Many ladies have shown interest in our recent paragraphs on the subject of the need for drivers for Government vehicles, and it is clear that many have been prevented from offering their services simply through lack of information and knowledge of how to set about it. As we stated in our last issue, all women drivers for home service are obtained from the Women's Legion.

This organisation has for several months past provided a regular supply of drivers for the R.F.C. and the A.S.C., and is now in urgent need of recruits, who should have some knowledge of driving, but need not be highly skilled.

The Standard Necessary for Recruits.

Recruits will be furnished with instruction, provided they have some groundwork on which instruction may be based. Any woman who can handle a car on the road need have no fear of offering her services, even though she has little idea as to *why* the car goes faster when she presses on the "little pedal between the two large ones." She must be capable, however, of swinging her own engine.

The Physical Standard.

The case of physical fitness is most important, as "soft jobs" are at a discount, but the work is not only healthy, but health-giving, even if strenuous.

Practically all the work is in the country, and long journeys are very common. The usual hours are 8 a.m. to 6 p.m. The normal leave is thirty-six days per year.

The Main Question and Uniform.

Pay is 35s. weekly, with 5d. an hour overtime, while superintendents receive 52s. 6d. weekly. Drivers have to keep themselves, but special hostels and food at army rates are available. One complete outfit per annum is provided for each driver.

The recruit must produce two references, pass an elementary driving test, and undergo a maximum of one month's probation at a salary of 25s. per week.

A promising recruit stands a fair chance of becoming an inspector at 40s. per week.

The majority of the vehicles are standard touring chassis fitted with van bodies, but some are sidecar combinations.

The National War Funds.

The National Relief Fund (distributed £3,743,877)	£6,324,423	0	0
British Red Cross Fund ..	8,917,243	15	0½
Tobacco Fund	147,454	0	0

Standardised Bicycle for U.S. Army.

Standardisation in all things has long been the agitation of the English technical press, but in America standardisation has for much longer been the manufacturers' achievement. The U.S. Government has now adopted a standard push-cycle—to wit, the Liberty—which is to be made by several leading cycle manufacturing firms.

Motor Cyclist on Tractor Work.

We reproduce below a photograph of Mr. R. P. Ravenhill, manager, Messrs. Fryer's No. 2 Garage, at Hereford, an engineer responsible for the Hereford unit of tractors working under the Food Production Department. Mr. Ravenhill often used to go in for competitions prior to the war, and won a good many medals on a 3½ h.p. Rover. He has been twice rejected for the army. The motor cycle garage with which he was formerly connected is now entirely devoted to agricultural tractors running under his direction, and one of these has accomplished the very fine performance of forty-eight acres in one week under the Government scheme.

Mr. R. P. Ravenhill, who has control of the Hereford unit of tractors working under the Food Production Department.

SPECIAL FEATURES.

1918 MODELS.

THE DYNAMICS OF BICYCLE LOCOMOTION.

MOTOR CYCLE AND MOTOR CAR RESEARCH.

American Navy Enlists Motor Cyclists.

It was quite in the early days of the war that the Royal Naval Air Service enlisted car and motor cycle drivers, who earned the sarcastic pseudonym of "deep sea chauffeurs." Now we learn that the U.S. Navy Air Corps needs motor cyclists as first and second-class petty officers.

A Motor Cyclist Signalman.

Schuetz, who is a motor cyclist enthusiast, and a signaller in the U.S. Army Machine Gun Battalion, has become so expert in the Morse code that he can signal while riding his machine with his hands off the handlebars. He declares he will take his motor cycle to the Front with him, and even go "over the top" mounted on his faithful machine.

Petrol in Stock.

We are often asked by readers what they may do with the petrol they have in stock, having purchased it before November 1st. The following answer is from the columns of our sister journal, *The Light Car:*

"The Petroleum Pool Board Distribution Committee has agreed to instruct all garages to buy back from their customers, on request, any motor spirit stocks which they may hold at 3d. per gallon below the wholesale price on the date of the transaction. At current price this represents a loss of 8½d. per gallon, made up as follows:

"The present wholesale price is 3s. 0½d., and the retail price 3s. 6d. Threepence less than the wholesale price is 2s. 9½d., so that anyone selling back his stock stands to lose the difference between 2s. 9½d. and 3s. 6d., viz., 8½d. With the exception of a very few who may have stocks by them, purchased some time ago, who would not lose so much owing to the then lower retail price, we imagine, that the majority will hold their stocks.

"WILL THE DUTY BE REFUNDED?

"Then there is the 6d. per gallon duty paid previous to the time of purchase, and apparently not recoverable, unless the Petrol Control Committee will accept the garage proprietor's endorsement on the licence coupon that the motor spirit has been brought back. What has the Petrol Control Committee and the Pool Board to say with regard to this point?"

he Association of British Motor and Allied Manufacturers.

The council of the above body has ecently received an additional member n the person of Mr. H. C. B. Underdown. dr. Underdown is the chairman and nanaging director of Commercial Cars, td., of Luton, and also chairman of he Commercial Vehicles Section of the .B.M.A.M.

inance and the Magneto.

At the general meeting of shareholders f Messrs. Simms Motor Units, Ltd., ecently held, it was decided to declare dividend of 25% of the paid-up capital f the company, to transfer the amount f £4,000 to reserve account, and to carry orward a balance of £33,757 15s. 6d. to he next account.

or Amateur Designers.

We observe that Mr. C. Binks, of hœnix Works, Eccles, is offering a prize or the best kick starter design sent to im, and no doubt a good many of the mateur designers from whom we regurly hear, and from whom we are always lad to hear, will be weighing in with heir ideas.

uccessful Appeal against Petrol Conviction.

At the Birmingham Quarter Sessions ast week, a motor cyclist appealed gainst a conviction registered against im on December 3rd, 1917, for illegal se of petrol. The appellant was repre-ented by the A.A., and was successful getting the sentence quashed. The lleged offence took place on November 8th, 1917, and in the magisterial court he defendant had been fined £4, or in efault twenty-one days' imprisonment. ho defendant, by the way, was Mr. ouster, an ex-champion cyclist, well nown some years ago in Midland cycling ircles.

otor Cycle Postmen.

Motor cycles are being used for the ollection and delivery of mails in oboken, New Jersey, and four Harley-avidson motor cycles and sidecars are eing employed in this manner. The ew method is expected to effect a onderful saving in time and labour so r as the collection and distribution of tters are concerned. Hoboken is one the first states in the U.S. to adopt e motor cycle as a means of helping e post-office.

ore Petrol?

We refer in our leader this week to e hope entertained by some motorists an early alleviation, if not settlement, the fuel crisis. Perhaps the most cheerful idiot" of this type that we ve met up to the present is the man ho is spreading a rumour, in which he plicitly believes, that the existing rerictions are to be waived for every eek-end during the summer months, so at the poor munition worker, about hose troubles we have recently heard so uch, may have a week-end's joy-riding! Some people are actually believing him, d we have had more than one querist king us if there is any truth in the mour. We take this opportunity of suring every reader that, as far as e are aware, the rumour is entirely void of any foundation in fact.

Yankee Compliment to a Britisher.

Indian, Wells, and Franklin are names that always ran together in the pre-war motor cyclists' ears. Mr. Wells informs us that his *confrère*, Mr. C. B. Franklin, late manager of the Indian Dublin branch, has been at the Indian factory for the last fourteen months, and has just been highly complimented by being nominated by the U.S. Government as one of the five engineers on the Standards Board, erected for the purpose of designing and getting out a standard army motor cycle.

The Motor Cycle in Sweden.

We have received the following news from a Swedish correspondent: "We have a dull time now in the motor world; all pleasure motoring has been abandoned, and all one is allowed is riding for testing purposes, and that to a very limited extent. We are resting in the Swedish Motor Cycle Club, Stockholm, where old friends from our pre-war competitions and trials often gather together. I have spent quite a long time in the club. We have very nice, cosy premises, and here we are lying on sofas in the smoking room in Oriental style, smoking and dreaming about the happy days before the war and of still happier times to come when peace arrives."

Selling Motor Cycles to U.S. Soldiers.

We extract the two following paragraphs from *Motor Cycle and Bicycle Illustrated* (New York): "Sales of Indian motor cycles among the 30,000 soldiers stationed at Camp Bowie, near Fort Worth, Texas, are being promoted through a well organised campaign conducted by the local supply company. Its chief feature consists of spectacular stunts to attract the attention of the men in khaki. Through these performances the sales force gets into personal touch with the soldiers interested. Little difficulty is encountered in closing with a soldier who shows sufficient interest to ask for particulars as to price and terms."

An "Aviation Stunt."

"One of the things which has attracted the attention of many prospective purchasers is the 'aviation stunt,' the specialty of O. L. Locklear, who is in charge of the mechanical department of the Burton agency. A 12in. board is arranged on supports at a 30° slant, with one end touching the ground and the other end elevated about 18in. The rider drives his machine on to the board at high speed, and as they leave the far end machine and rider sail through the air as high as 8ft., making a leap of about 60ft. before coming to earth."

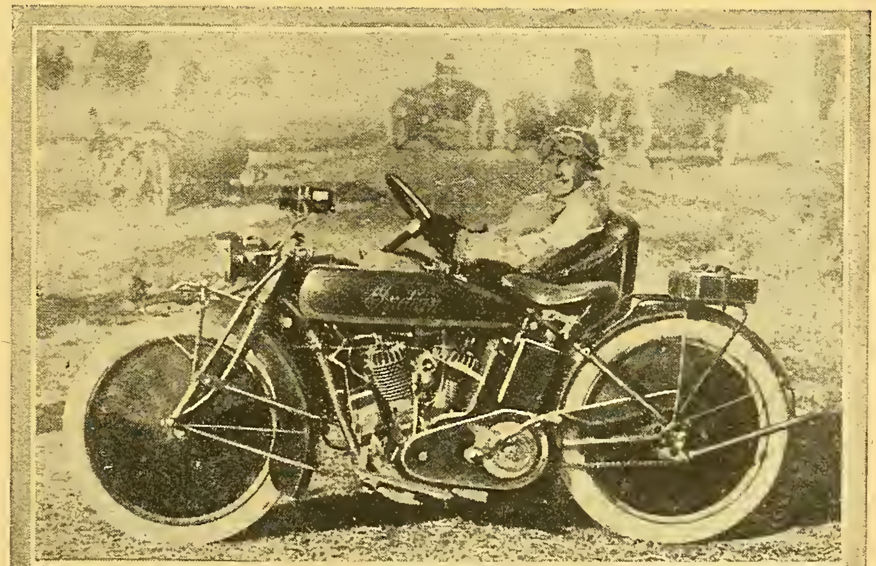
Some Taxi Restrictions.

The privileges enjoyed by taxis while all other motors enjoyed nothing but restrictions have long been a sore point with the private owner of car or cycle. Now, by a recent Order, the taxi is restricted in its operations to the area in which it is licensed to ply and three miles beyond.

The Greatest Reliability Trial.

Several times in these pages we have referred to the war as being the greatest reliability trial for motor vehicles ever held. Capt. Constant, an American motor cyclist, holds the same opinion, and wrote recently to an American contemporary the following letter: "Tell those birds who are wasting paper in your sheet *re* "The Best Endurance Run" to close up, as we have the best endurance run ever pulled off right here, and we can prove it to them if they will take the trouble to step in the nearest Recruiting Office. Tell them to sign up, and come on over; we will prove it to them, and it won't cost them a cent for transportation."

"Some" sense, "sure"!



MOTOR CYCLING IN LUXURY.

An Indian sidecar owned by a Spanish motor cyclist. He has fitted it with wheel steering, and drives from the sidecar seat. The controls for throttle and spark, brake, and clutch are inside the car. The finish of the outfit is enhanced by the fitting of disc wheels.

THE DYNAMICS OF BICYCLE LOCOMOTION.

The Question of Static and Dynamic Equilibrium.

LIKE the much-discussed problem of the squirrel on the pole, the problem of how the bicyclist maintains his balance by steering is one that may lead to endless discussion unless attacked from first principles. I have read with the greatest possible interest the numerous letters in *The Motor Cycle* on the subject. It is not difficult to discern that the writers have neglected the study of rigid dynamics—a very difficult subject, I admit—but one of immense importance to those who are interested in such apparently simple problems as the one in question. In the first place, your readers must keep distinct in their minds the two totally different problems involved by those of (*a*) dynamic and (*b*) static equilibrium. By (*a*) is meant the preservation of the balance of a body in motion, by (*b*) that of a body at rest. To take a simple example—the bob of a pendulum is in static equilibrium when the string or rod is perpendicular. It is in dynamic equilibrium when describing a circle at uniform speed. In both cases the string is in tension, and in the latter case, if there were no friction, the body would continue to travel in that circle *in æternum.*

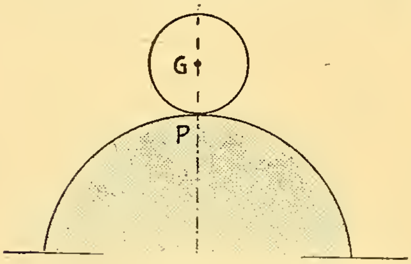


Fig. 1.

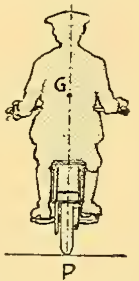


Fig. 2.

The finest example of a body in equilibrium and in motion is the earth or one of the planets revolving round the sun. We may go further and say that if the body be disturbed by an external impressed force acting for a certain period it will return to its state of equilibrium, provided the system is undamaged. We can conceive of an enormous meteor, say 100,000 tons, striking the earth, causing a local fracture, perhaps, but leaving the system unaffected, and the earth would continue its hustling progress round the sun.

Equilibrium.

Now let us apply this to the bicycle (1) at rest. Just like a billiard ball on a sphere (fig. 1), the cyclist and machine (fig. 2) are in a state of *unstable* equilibrium, because the slightest imaginable movement on the part of the sphere or rider will tend to cause the centre of gravity G to fall outside the point of support P and upset the balance.

This problem must be kept entirely distinct from that of the bicycle (2) *in motion.* First of all get rid of ideas of centrifugal force, gyrostatic action, circular motion, etc. Let us get down to simple first principles. The bicycle is a mechanical contrivance designed entirely for locomotion. Imagine a rider on a straight road. We have said that a body will be in a state of stable dynamic equilibrium if travelling in a straight line and does not require an external impressed force to maintain it in that state of motion. Now a bicycle is so constructed that *when in motion in a straight line, if it is attempted to induce it to leave the straight line, forces are immediately set up which cause it to return to that line.* This is the whole crux of the matter. When the cyclist moves along the line AB, and by a deflection of the handle-bar changes his position to C_1D_1 from CD (fig. 3), a force is set up acting perpendicularly through G, tending to right the machine and keep it in the straight line. This force is not necessarily brought into play unless the cyclist leaves the straight line.

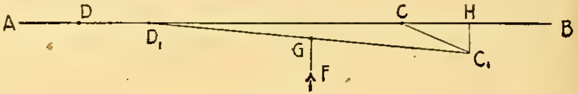


Fig. 3.

That is dynamic equilibrium, and that is the point missed by these critics. They are looking for a force that is not there, because it is an axiom in rigid dynamics that the body will be in equilibrium provided that, when it tends to leave the straight line, forces are immediately set up to cause it to return, and so it does not leave the line unless by a deliberate effort on the part of the rider. If the earth were to depart from its path *ever so little, enormous* centrifugal force would be brought into play to cause it to return to its path. The force F is so *great* for a *small* deflection C_1H that its ratio is infinite, and the body persists in its state of motion. This explains why a cyclist can ride "hands off" in a straight line.

Cornering.

Now take a cyclist rounding a corner. Here, then, is a steady deflection of the line, and therefore a steady force exerted through G (fig. 4). How is the equilibrium maintained?

Well, the rider subconsciously banks his machine until the force of gravity just balances the force F caused by the

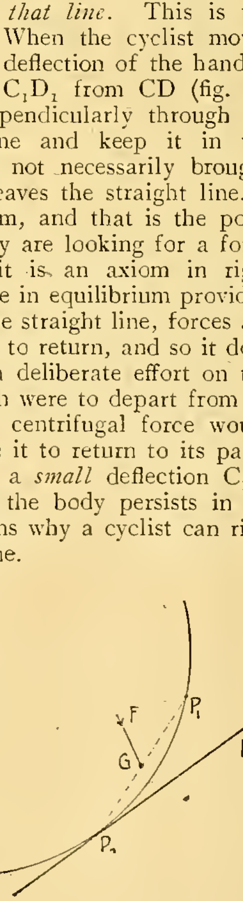


Fig. 4.

The Dynamics of Bicycle Locomotion.—

deflection from the line. How, then, are we going to classify the force F? Is it gyroscopic? Certainly not. Is it centrifugal? It can hardly be so, since it acts at right angles to the plane on which the circle is described. It is a force peculiar to the bicycle. It is called into being only when the path of the cycle departs from a straight line. A very little thinking will show how it is set up.

Suppose P to move from the straight line to a short distance to P_1, P_2 will also move, but it will be infinitesimal compared with P. Now what has happened to G? It has fallen to one side of P_1P_2, the line of support, and hence tends to cause the equilibrium to be restored. The force F then is none other than that of gravity. What else, after all, could it be for a cyclist on a straight, level road? When a cyclist is rounding a curve he simply banks the machine in order to bring G into line with P_1 and P_2. What part does centrifugal force play? It simply tends to increase the banking slightly. (Compare a railway engine where the banking of the outer line is unnecessary below certain speeds.) What part does gyroscopic action play? Very little. I ride a three-speed hub heavyweight scaling 170 lb. The back wheel of this is very heavy. Yet the steering is affected more by the *weight* of the rear portion of the machine than by the gyroscopic action, which is very little except at high speeds, the weight being chiefly concentrated in the hub.

Stability.

The whole problem of balance, neglecting considerations of centrifugal force, gyroscopic action, etc., is well illustrated from sculling. The light river "toothpick," so common in peace-time on the river at Oxford, is quite unstable when at rest, but when in motion the pressure of the water on the sides of the boat tends to prevent the sculler's body from departing from the vertical. At low speeds this is inadequate, just as it is in the case of the aeroplane.

In working out the stability of an aeroplane it is usual to ascertain whether the oscillations about the equilibrium position are sufficiently "damped" to justify it being classed as "stable." But in practice the machine at high speeds rides quite steadily except under exceptional circumstances. The same applies to the bicycle in motion. When the rider of a machine has learnt to trust to its inherent stability and be guided by it, he and the machine become, as it were, one unit, and as long as the wheels keep the road he is absolutely as safe as the earth on which he spins.

W ARTHUR JONES, B.A., M.Sc. (Oxon.)

Motor Cycle and Motor Car Research.

The Question of Forming a Trade Association for Research Purposes.

THE whole question of research work as applied to the motor industry is at present very much to the fore, and the motor cycle manufacturers may claim considerable credit for having been the first section of the industry to take this matter up seriously. Probably it will be found in their case, as in others, that the simplest and best procedure is to form a research association on the lines indicated by the Research Department. One of the great advantages of doing this is that it practically ensures a substantial Government grant.

It would be fairly safe to assume that the motor industry will probably not be long in following the example of the motor cyclist industry in forming a research association. It will be a good thing if the constitutions of these two associations could be in essence identical. This would make collaboration easier on the many occasions when it will no doubt be desirable. The problems with which the motor cycle industry is faced are not identical with the most obviously necessary research activities of the motor industry. It is inconceivable, however, that the two will never overlap. Many engine researches, for example, must be of almost equal interest to both, and the same applies to many researches into materials suited for use in engines and other parts. In other respects the research of the motor cycle industry can be combined perhaps more conveniently with that of the cycle industry. I am not suggesting that an attempt should be made to create one research association to cover motor cars and vehicles as well as cycles and motor cycles. What I do suggest is that it will be well to recognise in advance the certainty that all these will wish to collaborate at one time or another. If the constitutions of the various research associations, so situated, are in broad outline identical, and the basis of subscription is similar in each case, then collaboration and joint expenditure will be much more easily arranged.

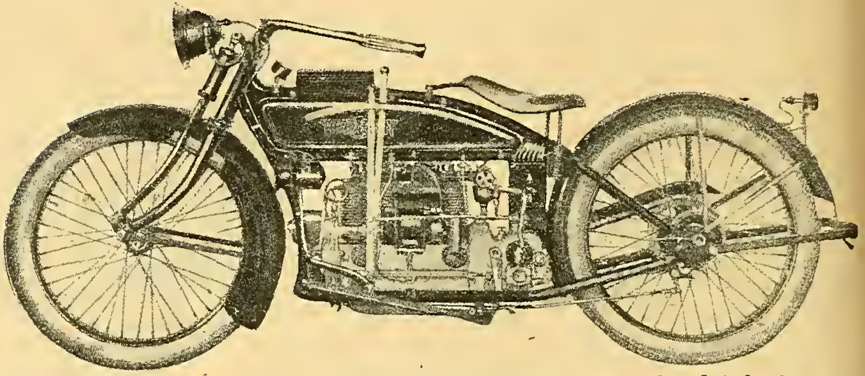
A Splendid Opportunity.

The next point to be emphasised is that we now have a heaven-sent opportunity of conducting useful research at a comparatively low cost to the industry. Up to a certain considerable figure, the Research Department will generally subscribe one pound for each pound subscribed by the manufacturing members of a research association. In other words, the Government pays half the cost of the research while the industry gets practically the whole of the benefit. Moreover, the manufacturer's subscription is paid out of income. Were it not used for research, it would not all represent profit. Some of it would certainly go in income tax. In many cases, still more would go towards the payment of Excess Profits Duty. Thus in effect the Government is really offering to bear a good deal more than half the total cost of research work. The inducement to the manufacturer is great, and if this opportunity is not accepted the industry will lose a magnificent chance of pushing ahead of its competitors in other countries.

Undoubtedly there are many firms that will readily recognise this position. Consequently, the last point I wish to make is that the thing should be absolutely unanimous. Those who stand out, if any do so, will be sorry later on, when the research begins to bring results in which they are not permitted to participate. The original members of the research association will no doubt take care that those who want to come in later, when the work has already borne fruit, shall have to pay very substantially for the privilege. W.H.

THE HENDERSON ELECTRICALLY-EQUIPPED MODEL.

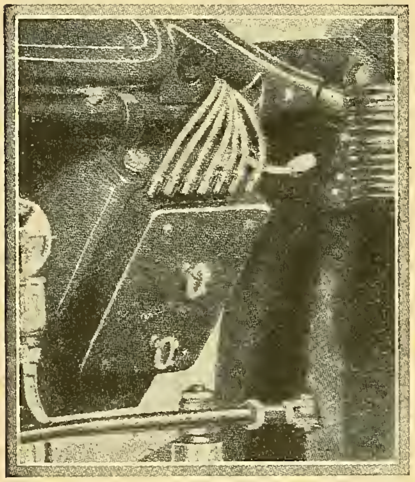
Particulars of the New Henderson Electrical Model, embodying Separate Generators for Ignition and Lighting Purposes.



The 1918 electrically-equipped model four-cylinder Henderson motor cycle. It is fitted with an engine of 778 c.c. and a three-speed gear.

IT has for some time been common knowledge that an electrically-equipped Henderson model was shortly to be put on the market, and detailed particulars have been awaited with interest.

The design of this model is particularly commendable, in our opinion, in that the extra fittings have not in any way injured the general proportions of the machine, which we described on November 15th, 1917, nor do they protrude as if they were casual afterthoughts thrown on and fastened in any odd position.



Showing how the battery can be swung to one side to allow the engine to be entirely removed from the frame without disturbing the wiring or dismantling any part of the electrical system.

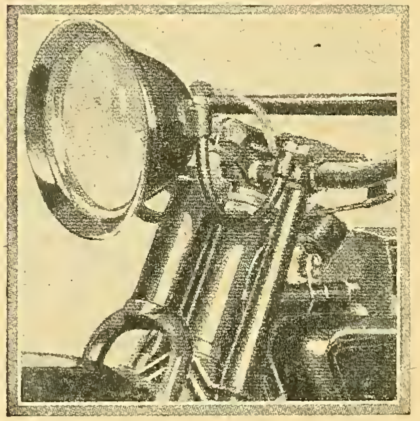
The high-tension magneto for engine ignition purposes is retained, and the generator for accumulator charging occupies a position similar to that normally taken by the magneto in English machines, viz., in front of the engine. It will be seen that the generator is a very compact piece of work, and as it equipped as an integral part of the motor, the question of drive has been very easily and neatly solved. It is driven by a shaft from the timing gears, which is both large and strong enough to ensure long life and reliability. The commutator is mounted on a half-inch shaft running on ball bearings, and has been designed with accessibility kept well to the fore. The commutator indeed may be removed after two screws have been taken out. All that is necessary in the way of lubrication is the replenishment of grease in the front cap about once a year.

Control and the Storage Battery.

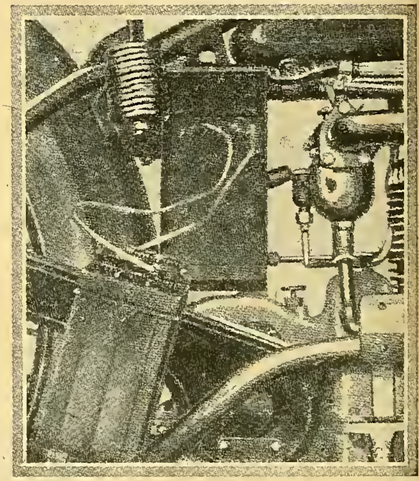
The control of the output of current by the generator is by means of a hand-operated switch. When this switch is in the "off" position the generator is obviously running free, and we are assured that when the generator is not working under load it absorbs practically no engine power, so that this model Henderson is as fast as the ordinary standard model.

The storage battery is carried underneath the saddle, and, as may be seen from the illustrations of the complete machine, is very neatly stowed away. The illustration of the storage battery itself shows how this may be swung out of the way so as to allow of access to the engine when this is necessary. Another interesting point about the battery is that it may be removed complete from its case without necessitating the disturbance of any connections. The battery is shown removed in our second illustration.

The head lamp is of the two-bulb pattern, a small bulb being fitted for use when the machine is standing, or whenever a powerful head light is not necessary, and, of course, it effects a saving in current. Only a single wire is used to feed the head lamp, the return circuit being by way of the frame, but provision is made for the fitting of a sidecar lamp, should this be necessary, by a double socket switch, one plug of which feeds the tail lamp, while the other is for the sidecar or a hand inspection lamp. The horn is also part of the equipment, and is fitted on the tube under the tank, immediately above the generator.



The head lamp, with the substantial carrying arms, and the current indicator mounted on the top tube in front of the tool box.

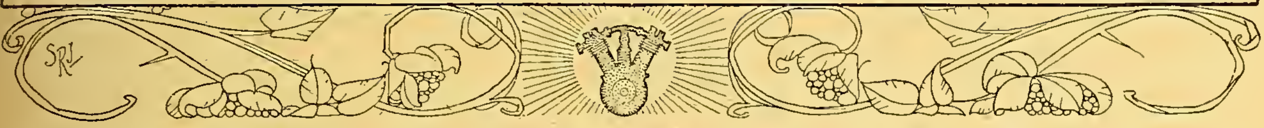


The batteries may be removed without disturbing any connections.

Wiring and Detail Arrangements.

The wiring and switch details have been carried out with the greatest attention to detail, and also include that very valuable asset, a fuse box. A fuse box is a fitting only too often omitted from far more elaborate lighting sets than the Henderson, and its absence has sometimes given rise to serious trouble. A current indicator, or ammeter, is fitted on the top frame tube near the steering head, and may be seen in the illustration of the complete machine immediately in front of the tool box. The extra price for this equipment in America is approximately £10.

BORING CYLINDERS & MAKING PISTONS.



Some Hints on an Undertaking generally handed over to the Expert.

READERS of *The Motor Cycle* have often made enquiries respecting the boring out of cylinders, therefore a few hints may be acceptable.

Before the work is undertaken it is well to grasp the fact that accuracy to $\frac{1}{1000}$ of an inch is necessary. The boring out of a cylinder usually necessitates the fitting of a new piston, which should be as nearly as possible of the same weight as the old one, and as times are not normal, and there will probably be some difficulty in obtaining a suitable casting, I will give some directions for the guidance of those wishing to make patterns and have pistons cut.

How to Make Patterns.

In making patterns use some close-grained timber, such as beech, or yellow pine, or sycamore. Take a small block an inch or so longer than the intended piston and round it roughly with a chisel; bore out the centre to form a rough cylinder much smaller internally and considerably larger externally than the piston. Fix this block in the lathe either by chucking it or attaching it to the face plate by four screws; turn up the outside a little larger than the required piston, say $\frac{1}{8}$in. all round. Next bore out the inside, making it very slightly smaller in diameter ($\frac{1}{32}$in.) than the inside of the old piston, finish with fine glass paper both inside and outside, cut the skirt dead true, and mark where the centre of the gudgeon pin will be; finally, cut off so that you have a perfect cylinder exactly the same length, or perhaps $\frac{1}{16}$in. longer than the length of the old piston, measuring from the skirt to the underside of the piston head. Now cut a disc about $\frac{1}{4}$in. or $\frac{3}{8}$in. thick to fit on top of the wood pattern; tack and glue this top on, making a neat joint. This allows plenty of metal to come and go on when finishing. Next cut the pattern in two, using a fine saw and cutting longitudinally; fit four small wire dowels to enable you to fit the two halves together accurately; and glue a strip of cardboard to the sawn edges to make up for the material removed by the saw. Next turn two bosses as nearly as possible the same size as the gudgeon pin bosses in the old piston; these are fixed by means of glue or seccotine and a small nail each to the inside of each half of the pattern, taking great care to have them diametrically opposite each other and also exactly the same distance from the underside of the head as the bosses in the old piston. A strengthening web may be glued to the underside of the piston head if considered necessary. This web usually rises from the gudgeon pin bosses, and ascends the walls of the piston and crosses the head. If a boss about $1\frac{1}{2}$in. long and $\frac{3}{4}$in. in diameter be left on the outside of the piston head (and, of course, in the centre) it will greatly facilitate turning.

I will not go into the question of turning up and fitting the piston, as that would take up too much time and space, and it is supposed that the reader is a sufficiently skilled mechanic to do that part of the work without instructions. I have described the making of the pattern because so few amateurs have any idea of pattern-making, though they may be very excellent workers at both lathe and bench. With regard to piston rings the following is about the best method.

Turning the Rings.

If it is intended to turn eccentric rings, turn the outside to the required size first, then knock slightly off truth and turn the inside to the required size, the object being to prevent fracture of the rings when cutting off, which might easily occur if the parting tool were to cut through one side before the other. With regard to the diameter of the rings, turn them the same as, or slightly larger in diameter than, the old rings in their expanded condition. After cutting off and before making the step-cut see that each ring is a nice fit for the groove it is intended to fit, and always fit each ring to its own particular groove.

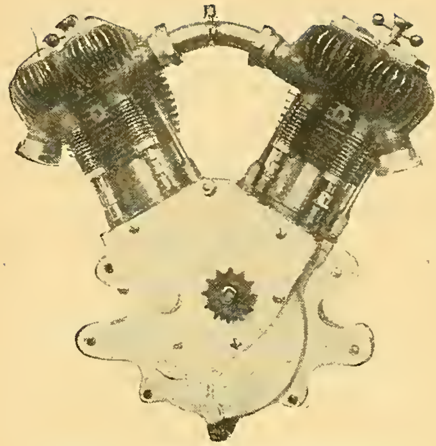
The best way to step-cut the rings is, with a small square file, to cut half-way through the ring at its thinnest part, turn the ring, and cut half way through or until the corners of the two cuts meet.

Now take as a mandrel any old thing about 1in. in diameter; turn up one end, reducing it to, say, $\frac{3}{4}$in. or $\frac{5}{8}$in., leaving a nice square collar, thread the reduced end to within $\frac{3}{4}$in. or 1in. of the collar, and fit a nut to the threaded portion. Next on this mandrel turn up two discs of any convenient thickness—$\frac{1}{4}$in. or $\frac{3}{8}$in. will do—to such a diameter that they will easily slip into the newly-bored cylinder. Place one of the rings between these discs, close the ring, and clamp it between the discs by means of the nut on the mandrel, taking care, of course, that the ring is as accurately centred as possible. Now with a round-nosed tool carefully turn down the ring until it just fits the cylinder, finishing with a fine file or with emery-cloth. By using a sharp tool and taking a light cut there is no danger of breaking the ring. If "R.D." makes his rings by this method he will obtain good compression immediately, and his cylinder will not be damaged in the "running-in" process. A little thought will demonstrate the folly of grinding in rings by using emery or carborundum in the cylinder, because it is obvious that by this method the cylinder is ground just as far off truth as the rings are ground to truth, and unless the rings are kept in the same relative position to the cylinder (circumferentially, of course, not longitudinally) good compression cannot be obtained. I hope these few tips will be useful.

H.H.

The New 7-9 h.p. Twin-cylinder Blackburne Engine.

Bore and Stroke 85 mm. × 88 mm. = 998 c.c.



The bore and stroke of the engine are 85 mm. × 88 mm. = 998 c.c.

THE firm of Messrs. Burney and Blackburne, Tongham, Surrey, is one which was founded by young and enthusiastic riders, who certainly knew what was best in motor cycle design. At the outbreak of war every one of the principals of the firm—the brothers Burney and the brothers Roberts—answered the country's call, and one, alas! sacrificed his life. Since those days the company has undergone one or two changes, is now under new management, and has extended to a considerable degree. The services, however, of Mr. J. S. Holroyd are still retained. He is the company's designer, and is well known to our readers as a competition rider of conspicuous pluck, who has had a lengthy experience on the road.

Interchangeability.

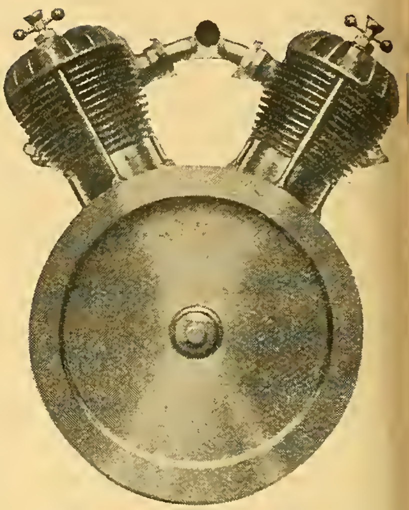
In designing the 7-9 h.p. Blackburne Mr. Holroyd has borne in mind the successful 3½ h.p., that well-known single-cylinder, the extreme reliability and sweet running of which rendered it so successful in many competitions prior to the war. Practically every part of the twin is interchangeable with the 3½ h.p. single, which, of course, simplifies the spare part question to a great extent. The cylinder dimensions are the same, viz., 85 mm. × 88 mm., and the cubical capacity of the twin is 998 cubic centimetres.

The photographs of the engine will show that the cylinders are identical except for the slight variation in the design of the combustion head necessary in the case of a twin-cylinder engine, and this combustion head retains one of the earliest forms of exhaust valve caps provided with a means of radiating heat. The cylinders are held in position by three bolts, which are screwed into the aluminium of the crank case, and it is interesting to note that the threads of these are tinned before being inserted, the theory being that two white metals will grip better than plain steel against aluminium.

A portion of the engine which is different from the 3½ h.p. is the crankshaft, which we illustrate without the balance weights, these being attached later. The right-hand portion of the crank cheek and crank pin are now machined from one piece, and are hardened and ground, but the left-hand portion is secured by a key, a taper, and a nut, the latter being finally made fast by means of a grub screw. The object of this is to enable the forked connecting rod to be easily fitted. The design is certainly good, and should be effective. On the opposite side of the right-hand crank cheek, not shown in the illustration, is a small hole, from which a groove runs for conveying oil to the hollow crank pin, which is drilled in the centre, so that, as the crank revolves, oil is picked up by the grooves and forced out through a hole in the centre of the crank pin, thus adequately lubricating the big end bearings.

Engine Details.

The crankshaft runs on Skefko self-aligning ball bearings, each having a double row of balls, which are pressed into the crank case. The same piston as fitted to the 3½ h.p. is employed, and is provided with a hollow gudgeon pin, which is secured by a set screw, the end of which passes through the boss into the centre of the hollow gudgeon, and is then fastened with a split pin, while, as a further means of anchorage, the lower of the two step-cut rings with which the piston is provided passes over recesses cut at each end of the gudgeon pin.



Flywheel side of the Blackburne engine.

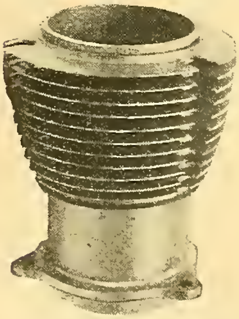
The Magneto Drive.

As an illustration of how interchangeability has been carried out in the design of this engine, we may mention that the exhaust union nut is identical with the two union nuts at each end of the inlet pipe, while, further, the two larger timing pinions are absolutely interchangeable, so that if the timing cover be changed for another which is suitable the magneto driving sprocket can be carried on the other side, so that with the least possible amount of trouble the magneto may be fixed to either side of the engine, or, if necessary, a bevel gear can be supplied which will enable the magneto to be fitted to a bracket in front of the timing gear case as in the engines on the latest Morgans. The timing gear is simple and well designed.

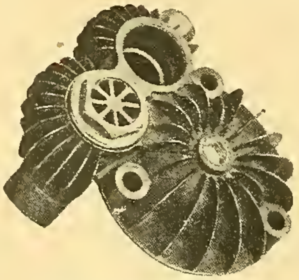
If desired the engine can be fitted with water-cooled cylinders.

Of course, the outside flywheel, so long a feature of the Blackburne, has been retained, and that fitted to the 7-9 h.p. twin weighs 20 lb. This engine will fit any frame suitable for a J.A.P. engine without there being any need to alter the belt or chain line.

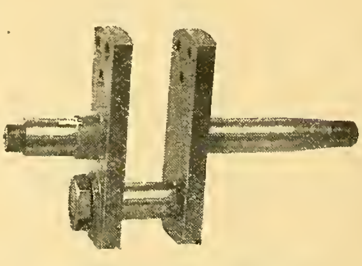
Altogether, we were much impressed by the excellent finish, workmanship, and simplicity of design of the latest Blackburne production.



The cylinders are held in position by three bolts screwed into the aluminium of the crank case.

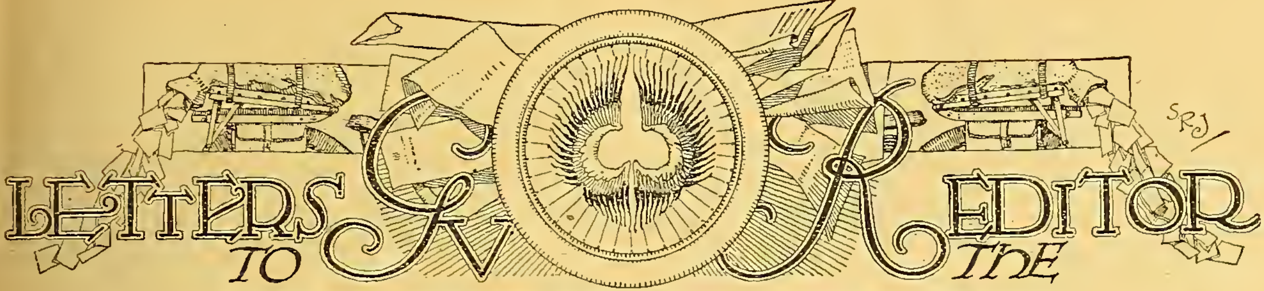


Combustion head. Note valve caps designed to radiate heat effectively



The crankshaft runs on Skefko self-aligning ball bearings

The lower of the two step cut piston rings passes over recesses cut on each end of the gudgeon pin.



The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

PETROL FOR SOLDIERS.

Sir,—Referring to the granting of petrol permits to men of His Majesty's Forces while on leave or convalescent, it might interest some of your readers to know that there is no chance of getting a permit unless the applicant can show that the motor cycle is registered in his own name.

For instance, my brother and I have been using one machine between us for two or three years now, but during my leave I could not get a permit, as it was registered in my brother's name. Therefore, if brothers (or others) are joint owners of a machine, they will have to keep transferring the registration from one to the other before commencing their leave, or the permit will not be forthcoming. JOHN V. H. TURNER, A.B.

Sir,—My son came home on leave from France on November 24th; the day after he wrote to the Petrol Control Board for leave to ride my 6 h.p. Enfield and sidecar with myself as passenger. He enlisted at the age of sixteen years and two months on August 26th, 1914, and has gone through a great deal of fighting since. All that he requested from the Control Board was leave to use some petrol I had saved for him. On the 30th he saw in *The Motor Cycle* that the Petrol Board would allow leave men to get petrol for any purpose. Acting on this we went for a ride to Windermere to see some friends, and came back last Wednesday without any interference from the police. My son returned to France on the 7th inst. On Saturday morning a letter came from the Control Board to say that they could not allow him to use the petrol for the use he wanted. I understand that the Control Board are prepared to grant licences to buy petrol to men on leave, but in this case they refuse leave to use the petrol we had; also, what is the use of granting leave to ride and not replying till the men have gone back? I may say that he informed them of the date he had to return. Thanks to the announcement in your paper, we got all the riding we wanted. H. BROGDEN.

AUTOMATIC LUBRICATION.

Sir,—I have read with great interest the articles you have published from time to time in the "Blue 'Un" concerning lubrication. Having now run my T.T. Norton, fitted with a Best and Lloyd throttle-controlled mechanical lubricator, about 5,000 miles, I can safely say that lubrication worries have entirely disappeared. I use the machine daily in any and every weather condition, and have even put the sidecar on, thus pulling more than double load, so that the engine has been called upon to do more than it was really designed for. As you no doubt are aware, by overloading weaknesses are made known. The great feature is, of course, really economical lubrication. I have got all adjustments down as fine as I can at present get them, and my last quart of oil ran me 994 miles, and the quart previously 987 miles. "Coolie" and Price's Huile de Luxe respectively were used. Even at these figures the engine is over-lubricated. Mind you, none leaks out, as I exercised great care in fitting bearings and joints. Personally, I do not think 5,000 miles per gallon is at all impossible. I have to decarbonise at 600 miles. I do not try to run longer than that. No appreciable difference is noticeable with summer grade and winter grade oils so far as consumption is concerned, which, I think, is solely due to the automatic ball valves used. I fitted the sight feed in the usual position on the tank, and at various throttle openings and engine speeds the flow of oil is distinctly seen; just a glance when in doubt—not *give a pumpful to make sure.*

Just one more item. The petrol consumption has been 113.4 m.p.g.—quite a passable all-round consumption. If there are others who have got better m.p.g., then it is to the benefit of the industry to make it known, although the times are not as they might be for competition purposes in this respect. SNOSTONE.

Surrey.

A ONE-LEVER CARBURETTER.

Sir,—The logical development of every machine and system being in the direction of simplification—not necessarily mechanical simplification, but operative simplification—it is rather surprising that a more insistent demand has not been evidenced for some attempt at a reduction in the number of "twiddly-bits" on the present-day motor bicycle, which really strike one as being quite formidable after the simple easiness of driving a car. Mechanical lubrication for motor cycles appears to be on the way now, but it seems to me that the carburetter controls even more urgently need attention. Looked at in the hard white light of criticism, the two-lever carburetter, it must be admitted, is only a halfway stage in the evolution of the ideal.

It would be of considerable interest, I think, if some of your readers, both technical and lay, would give us the benefit of their experience of the single-lever carburetter as regards freedom from mechanical trouble, satisfactory carburation at starting and at speed, and economy in consumption. LEWIS DICKINS.

PISTON-RING FRICTION.

Sir,—Permit me to remark regarding "Chinook's" blast of hot air in January 17th issue of *The Motor Cycle* that he seems to have designed his deep piston ring when enjoying an after-dinner cigar. It is quite impracticable. Suppose the piston to be 3in. in diameter, the ring—$\frac{5}{16}$in. deep—would require to be opened out to at least a 2in. gap to slip over the top of the piston. The depth of the ring must be limited to much less if it is to be successfully sprung into position. W. M. BROWN.

Sir,—"Chinook's" article calls for comment. Is not 1,000 r.p.m. a high figure to give as the average difference between engine speed of a high-efficiency engine (so-called) and the more orthodox type? Considering it is current American motor cycle practice to fit three piston rings, is not "Chinook's" statement on that particular point extremely absurd? Will "Chinook" give his authority for stating that "the leakage of gas between the rings and cylinder is infinitesimal compared with the leakage round the back of the rings," and has "been proved by *practical research*"?

Is the friction of the rings due more to their face contact with the oil film, or to the scraper action of the sharp edges of the rings piling up oil in front of each advancing ring's edge? I am inclined to think the latter is the fact, and therefore cannot see where the utility of such a ring as suggested by "Chinook" comes in.

It would be very interesting to have the opinion of your two-stroke rider readers on "Chinook's" theory that the gumming up of piston rings in their favourite mount is due to escaping hot gas. With visions of the nervous strain, usually engendered when removing and replacing piston rings of the ordinary type, I should feel compelled to specify on any engine of mine that rings of "Chinook's" type should *not* be fitted (if they ever come to the stage of being subject to such rejection, which I very much doubt). J.W.

Belfast.

PETROL FOR MUNITION WORKERS.

Sir,—I was particularly interested in your remarks in your issue of January 3rd regarding a small allowance of petrol to motor cyclists who are engaged on important war work. Those of us who are engaged every day (including Sunday), with day and night shifts, absolutely all out on the manufacture of munitions, feel that if it is at all possible to spare a small quantity of petrol or substitute for an occasional recreative run something should be done to help us.

I would not suggest more forms to be filled up, or any additional clerical work for the Petrol Control Department—simply a statement on our present licence that not more than two gallons per month be used for recreative purposes, and trust to our honesty. For myself, during the past two and a half years my motor cycling has been confined to occasional runs on Saturday afternoons or Sunday nights out into the country for a breath of fresh air, with peace and quietness. Even as recreative runs the petrol was not entirely wasted, for it was while away from the noise and hurry that I got most of my ideas for methods and machines which are holding records in the quick production of munitions.

We feel that the present restrictions are more due to newspaper campaign than actual necessity, else why allow so much petrol and oil to be used by motor vans every Sunday delivering Sunday newspapers?

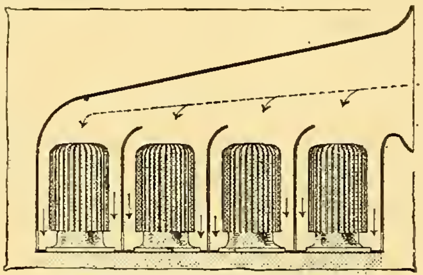
Recently I examined a number of these papers, and found only a very small space devoted to the previous night's war news, the rest of the paper being made up of breach of promise cases, divorce actions, murders of individuals, and reviews upon the war, football, advertisements, dog-racing, and photographs of nothing in particular.

To an engineer, there appears to be nothing of national importance making it necessary to have these papers specially distributed by motor vans.

We base our claims that if it is possible to allow so much petrol to be used for the above, some consideration ought to be given to those who are giving their level best to further the output of war material in particular.

Glasgow. WORKS MANAGER.

COOLING AERO ENGINES.



A suggestion for cooling aero engines.

Sir,—*Re* cooling problems on aero engines, published in *The Motor Cycle*, would it not be possible to enclose cylinders as sketch, and direct the cooling draught down and all round, so that the hottest part of the engine would get the cold air direct instead of on one side only?

F. WHITWORTH.

GOODS MADE IN GERMANY!

Sir,—It is impossible for me to allow F. Jones's letter in *The Motor Cycle* of January 3rd to pass without some comment. Judging by the composition, it seems to be the work of a six-year-old schoolboy, and by the grammatical mistakes it gives the impression of a foreigner (perhaps a Hun) able to put a few sentences together. Now, F. Jones wants the proprietors of *The Motor Cycle* to do as he says, and unless they do he and his very few friends will ask the "Blue 'Un" to retreat from his immortal library. Let me tell F. Jones that if he and his few friends abandoned the "Blue 'Un" it would make no difference to the proprietors, but if he managed their affairs it would make the world of difference to the company.

In my opinion, as an old reader, he is simply a scaliwag and unworthy of anything British. BRITON.

Grovesend, Glam.

Sir,—I wish to congratulate you on the very excellent articles you have lately published on the chemistry and physics of internal combustion engines. They are first-class. Also on your stand against "Goods made in Germany": the type of mind that calls such a genuine effort to carry into effect the freeing of our nation from German domination "Political propaganda" is one which need never be feared by "sportsmen." It would be interesting to know whether your correspondent belongs to the "No Conscription Fellowship" and other kindred bodies. We all, however, respect him for signing his name. F. C. LEES.

Sir,—Mr. T. Tanner uses the arguments of the professional pacifist, though in view of his assurance that he is a discharged soldier of September, 1914, I can only assume he uses these arguments without careful deliberation.

He sees further war if we boycott German goods, but he appears to forget that previous to this war German goods were allowed in this country without taxation or penalty. German manufacturers had the privilege of exploiting this market without paying their share of taxation as does the English manufacturer, and, in spite of this, Germany bolted and barred its doors against our manufactures, unless we were prepared to pay the penalty of protective tariffs.

With regard to the profiteer, Mr. Tanner is surely not so simple as to think that the opening of our markets to the Boche will eliminate the profiteer. Opportunities create profiteers, and when our Allies and our own manufacturers are able to compete, and are free from war orders, the profiteer must disappear.

Mr. Tanner's conception of the brotherly spirit is, in my opinion, a selfish conception altogether, as he states that he is going to buy the German article if it suits him best. Surely with the violation of all national law, and the sinking of our hospital ships so fresh in our memory, we are not so weak as to encourage amongst us such a treacherous, unmanly, and ungenerous neighbour.

The president of the Institution of Electrical Engineers wisely stated in his inaugural address that the German salesman has to learn that his wares, like his deeds, stink in our nostrils, and that no Briton who values his self-respect can enter into any sort of intercourse with members of a nation that bedded our wounded men, prisoners in their hands, on horse-dung, and kicked and spat upon them as they lay in silent agony. M. H. GOLDSTONE.

Sir,—I am afraid I cannot refrain from two or three remarks on the above subject. When the notice was first published it struck me as being quite a worthy and patriotic idea. But, on consideration, I am inclined to think that Mr. Ives is right in censuring it. Surely the latest suggestions *re* peace terms include a clause to the following effect: "There shall be no trade war."

The enormous populations of Germany and Austria must live somehow after the war; and they are not, and cannot be entirely, independent of the products of other countries. They must go somewhere in order to obtain these products, and therefore they must reopen trade with other countries. Are the supporters of your notice prepared to stop the sales of British goods to Germany? If not, and they expect these to be resumed after the war, how do they expect them to be paid for unless we buy goods from Germany? X.Y.Z.

Highgate.

Sir,—Referring to the letter of Mr. Chas. S. Ives under the above heading, in your issue of December 13th, I fancy if he boycotts all papers that preach a propaganda with which he does not agree, he will go paperless to bed. Further, if I may be allowed to say so, I think it is a great mistake to confine oneself to papers which preach one's own ideas; it leads to political narrow-mindedness—a very undesirable position.

I thoroughly agree with you, Mr. Editor, in your boycott of "Goods made in Germany," and think the great majority of your readers would say ditto. Personally, if, in the future, I cannot get a motor cycle without German parts, I will stick to my push bicycle. To do otherwise would be a funny way of showing our gratitude for the great sacrifices that have been made by our fellow motor cyclists in the great war. G. WILLIAMS.

Sir,—Can you spare me an inch of space to reply to Mr. Maurice Little (a most appropriate surname, exactly describing his mental outlook)? I wonder what German-made article Mr. Little is interested in. He talks of a clean, sporting journal. Why? I fail to see how the element of sport enters into the question; and, anyway, who wants to be sporting with a people who have not an idea of the meaning f the word? If Mr. Little saw a hefty brute about to murder is mother, would he be sporting, like a little gentleman, and ay, "Look out, put up your hands, I am going to hit you"? r would he do as I and, I think, most people would do— ackle the murderer from behind with a knuckle-duster, failng a more deadly weapon, or else kick him well?

As a matter of fact I do not believe he would do either; e would probably run away, if I am any judge of character.

I daresay Mr. Little, the Pacifists, and other pro-Germans, vould like to see an economic peace with Germany after the var, but I do not think anyone else would.

In conclusion, you are quite at liberty to furnish your correpondent with my address if he desires it. And if he takes xception to anything I have said I shall be most happy to neet him and discuss (!) the matter; but I give him due varning that I shall have an armed friend near to be on the ook out for his German "sporting" tactics.

E. J. L. STRONG.

DEAL MACHINES.

Sir,—I read with interest Hurtebize's article on "Ideal Machines" in the issue of December 13th, and I note that he is sighing for a flexible motor bicycle. He stipulates silence, flexibility, power—not extreme speed—and comfort; also two speeds only, steady engine, and one that approximates to the old 2¾ h.p. De Dion.

Now there is one machine that fulfils all these conditions, and that is the 3½ h.p. two-speed P. and M. I have ridden four machines of this make of years ranging from 1906 to 1913, and the same qualities have been distinguishable n each.

The P and M. is a low compression engine like the De Dion, and I think this accounts for its flexibility. It s also the easiest starter of any machine I have ridden. I agree it would be improved by rear springing, but this seems to be the only point in which it differs from your contributor's ideal machine.

I may say I have no interest in the makers, but am a great admirer of their product. FLEXIBILITY.

Leeds

CENTRIFUGAL FORCE.

Sir,—"G.R.B." asked "Mohandis" to adjudicate between he former and me.

"Mohandis" has given judgment against me, when he ays I was confused between "the mental and muscular operations which control the forces that hold a bicycle upright and the forces themselves."

Then he declines to sum up the pros and cons of the discussion, so I venture to undertake this task myself.

I was not wrong or confused, as stated in above quotation. For let "Mohandis" ask a despatch rider after a long ride: Are his muscles aching? If they are, what made them ache? Holding up the bicycle? "Mohandis" admits the mind plays an important part in riding a cycle, but he adds t is only a controlling operation, which I take to imply that he mind is not a force. This may be correct, but he includes he muscles, and where the mind, the nerves, and muscles each begin and end I do not know.

It may even be that it is the same force which operates the mind that moves a motor cycle, or an electric train, or a team engine. George Stephenson explained the force of the ocomotive as "bottled up sunshine." Maybe all force comes rom the sun, and is the same. However, we have arrived at the conclusion that the forces holding up a ridden cycle are: A. Centrifugal force. B. Gyroscopic action of the wheels, etc. C. Altering the base of support under the centre of gravity. D. Physical (mental ?) force of the rider.

A and B are in evidence when the cycle is moving, and ncrease in ratio to the speed. They are not present when he cycle is stationary.

C and D are always present, but are most in evidence when tationary or travelling slowly, and are *the* forces which upold a cycle and rider. They are assisted by their servants A and B. Then again, when A and B are most in evidence viz., at speed), C and D must still be the dominant forces, or disaster will occur; and, should the machine travel so quickly that A and B become the stronger forces, there will happen "speedman's wobble."

When cornering at speed a rider will use his weight to ssist his muscles to master A and B, which, in my opinion, ombined with the numberless corrections to A and B which have become necessary by unevenness in the road, etc., is quite enough to cause muscles to ache.

I beg to thank "G.R.B." and "Mohandis" for their interesting contributions, and ask their forgiveness for the following: "I think they are engineers, and as such they overlook the rider. They talk about the cycle doing this, that, and the other. Their minds are mostly on the engine and machine; but a motor cycle is incomplete without a rider, and it is more under the influence of mind, muscle, and nerve than any other machine of which I can think—except a mangle." TOP HEAVY.

Newcastle-on-Tyne.

EXPERIMENTAL AERO ENGINES.

Sir,—Your able contributor "Ixion" has honoured my letter on the subject of State aid for inventions with a lengthy and somewhat ambiguous "Comment," and as "Ixion" evidently did not read, or at least inwardly digest, the subject matter of my letter before starting out with his journalistic bludgeon, may I point out to him that I did not mention, let alone criticise, the Royal Flying Corps, but dealt merely with what appeared to me to be an exaggerated statement on the possibilities of State aid for "promising aero engines."

"Ixion" declares his opinions of "inventors" with all the fervour our religious forbears used towards "heretics," and, while disclaiming all personal knowledge, uses my name so freely, and claims sufficient acquaintance with my designs and experience to assert his own superior knowledge, that I am open to "bet a gallon of No. 1" to a "spot" that he is one of the official disqualifiers.

As "Ixion" appears to be still enthralled with the bogey of "Deutschland Uber Allies," may I remind him that Germany certainly did take precedence over all nations in supplying State aid, and regarding her policy with aero engines, refer him to the masterly summary of that policy in the issue of January 17th.

The subject of "making good" has nothing to do with the case, and a large number of so-called "scientific" reputations are based merely on the ability of the individual to expose the knowledge he has accumulated in a fluent manner, while another individual applies similar knowledge to a practical purpose and is dubbed a mere engineer.

"Ixion" endeavours to cover the official apathy under the veil of standardised production, but during the first year of the war there were no settled designs to be reproduced! May I ask "Ixion" why he has not made up his mind and produced a standard motor cycle; also, why did the Americans find it necessary to design an engine when the truly marvellous engines developed by the Allies were at their disposal, if it was not to secure that last "ounce of efficiency"?

In conclusion, I should like to thank "Ixion" for the semi-official confirmation of the warning conveyed in my letter, and to suggest he should devote a few "Comments" to the improvements that are considered essential in official circles.

Glasgow. M. E PHILBROW.

3D.

THE PRICE of THE MOTOR CYCLE

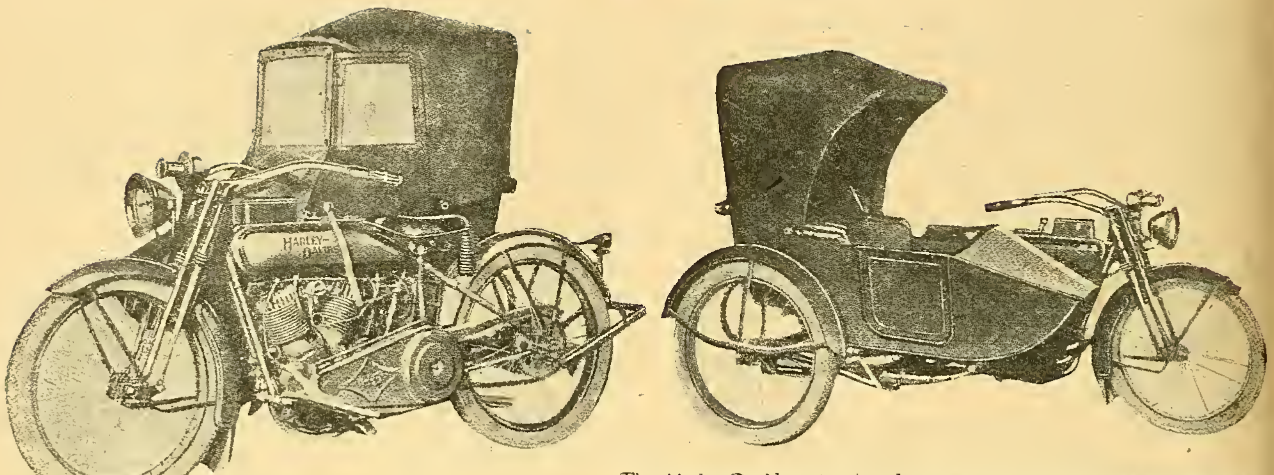
TO BE RAISED TO 3D ON FEB. 7th.

This further increase is necessary owing to the drastic restriction imposed on the import of paper and paper making materials during 1918 and the consequent heavy advance in the cost of paper, but the price will be reduced as soon as circumstances permit.

The subscription rates will be correspondingly raised on renewal or to new subscribers:

British Isles	15/2	per annum, post free.
All countries abroad..	19/6	" "

All subscriptions current at the time of reducing the price will be proportionately lengthened for the benefit of each subscriber.



The Harley-Davidson hood and screen recently placed on the American market. A feature worthy of note, although not a new idea, is the wind deflector, which is part of the screen itself, and protects the passenger from air currents thrown off from the rider's body when travelling.

The Need for Petrol Economy.

THE *Daily Mail* for January 25th publishes some remarks of Mr. A. Shrapnell-Smith, Economy Officer to Mr. Walter Long's Petroleum Executive Committee. Mr. Shrapnell-Smith's duty consists in seeing that waste of petrol is checked in all spheres, and his remarks on the continued need for rigid economy in the use of petrol are interesting, and we think they will be considered as a serious warning as to the unsatisfactory nature of the present fuel situation. "Visible stocks are no test," says Mr. Shrapnell-Smith. "The only real test is the supply landed each month. This test now, compared with six months ago, shows a very marked decline. There is a direct connection between petrol economy and the price and supply of food. A gallon of petrol in a commercial lorry moves three tons of food eight miles. It is not much use having food in the country if it cannot be distributed."

Mr. Shrapnell-Smith also states that coal gas is being used, where possible, for army transport, or for driving any internal combustion engines where practicable. He concludes his remarks by saying that paraffin is not rationed because it is the light and fuel of so many thousands of poor people, but it may be shortly.

There is no doubt that there is still a feeling that there is plenty of petrol about, but Mr. Shrapnell-Smith is particularly careful to point out that a real shortage does exist, and not only does exist, but may get worse. There is, indeed, a rumour abroad that in a few months time petrol will cease to be issued for civilian purposes.

* * *

Home-produced Fuel.

"THE following statement," says the *Board of Trade Journal* for January 17th, "has been issued by the Ministry of Munitions respecting the policy of the Ministry on the production of oil from home sources:

"Certain communications have recently been made to the press upon the subject of the production of mineral oil from home sources. These communications are apparently based on incomplete information, and therefore may have created a mistaken impression.

"Apart from the very serious technical difficulties which have to be overcome, the competing claims of other urgent war services for labour and materials render impossible the rapid development of methods which might otherwise be pursued with advantage. The Ministry of Munitions, however, has been steadily pursuing the policy which is considered to be best designed to produce substantial results in the shortest time. It is obviously undesirable to explain the actual methods or to state the quantities of oil which it is estimated will be produced, but it is thought that some indication may be given of the general policy which is being followed.

"All existing plant at the shale works of Scotland and the gasworks and coke ovens throughout the country are being pressed to their full capacity and are being extended as far as present circumstances permit.

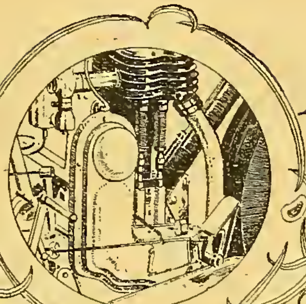
"It has been found by experiments that certain plants already in existence can be adapted in a short time to treat new material by new methods. This adaptation of plants is being actively pursued, and has the obvious advantage of saving labour, time and material, and making the best use of existing staff and equipment. On the other hand, where suitable raw material cannot be dealt with on existing plants, arrangements are in progress for erecting works for the extraction of oil.

"Some of the correspondents suggest that a very large output of fuel oil can be obtained because one unit can produce or has produced a given quantity of oil. In the present state of supply of labour and materials any such easy multiplication is liable to be entirely fallacious." Nevertheless, the statement is very interesting.

A CLEAN REPAIR.

The accompanying illustrations show a pair of Scott motor cycle cylinders badly cracked by frost. As will be seen, practically the whole side of the cylinder on the left was bulged out by the pressure. The same cylinders are shown after a clean weld by Barimar experts leaving no trace either of the fracture or the weld

QUESTIONS AND REPLIES



Loose Ball Bearings.

The ball race cages of my 5-6 h.p. Rudge-Multi will revolve in their housings. Is it advisable to have them fixed? If so, can you suggest the best way of doing this?—A.H.B.

Yes, it is advisable that the ball bearings should be fixed in their housings. Perhaps the simplest method would be to wedge them with a thin strip of brass, placed round the cage.

Loss of Compression.

I have recently overhauled my 1914 Triumph motor cycle. I carefully removed all the carbon deposit from the cylinder and piston and ground in the valves. I carefully replaced the cylinder and valves, but when I took it out for a trial run I fancied that the compression was not so good as it had been previous to cleaning. I may state that when I removed the piston ring and cleaned the groove I found that the ring, when replaced, was fitting very loosely. Would that cause less compression? Also, I find that air is sucked in and discharged through the axle of the pulley. There is no play in any portion of the engine.—BO 1195.

It is by no means uncommon to find, after you have removed the carbon deposit from a motor cycle, that there is not so much compression and that the engine does not pull so well for the first 100 miles or so. This is due to having removed the carbon from round the piston rings, which it is not always advisable to do unless the rings are stuck; also to leakages round the valve caps, etc., which finally make up with burnt oil. The air sucked in and discharged through the hole in the centre of the main axle is the natural state of affairs, crank case compression release taking place in this manner.

Storing a Motor Cycle.

I intend to lay up my motor cycle and sidecar for several months. I should be greatly obliged if you would tell me the best way (1) to prevent the tyres deteriorating, and (2) to lay up the engine. I have already removed the tyres and enamelled the wheels, removed all the driving chains and put them into a bath of lubricating oil. From a cursory glance at the Enfield gears, I conclude that vaseline would impair the efficiency of the bands. Is this correct?—C.H.R.

(1.) The tyres should be hung up in a dark, cool place, while the tubes may be stored in a box full of French chalk.

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

(2.) The best plan is to take the engine completely to bits and wrap up every part, after thoroughly greasing it, in oily cloths. If the machine is to be stored in a really dry place you need not go to this trouble. First, liberally over-oil the engine, and run it till it very freely exudes dense smoke from the exhaust. Before it cools, apply thick cylinder oil to the outside of the cylinders with a paint brush. The oil will run freely into all the nooks and corners if applied while the cylinders are still hot, while the over-oiling will have assured the whole of the engine—including valve mechanism and the combustion heads—receiving a thorough coating of oil. When finally the engine is left, see that all valves are closed. Vaseline should not impair the gripping efficiency of the expanding rings of the Enfield gear. If it were found to do so, it would be a simple matter to wash out the vaseline with petrol or paraffin and refill the gear with oil.

Use of Coal Gas.

With regard to the recent Petrol and Gas Order, I take it that gas may not now be used for pleasure rides. Is this so? Also, would it be legal to make a gas trailer myself for my own use? I have the necessary wheels, and could easily make the axle, springs, and other fittings. Would it be necessary to carry a rear light on the motor cycle as well as on the trailer?—W.C.

The Order relating to the restricted use of coal gas comes into operation on February 9th, before which date you may use gas for any purpose you think fit. After this it may only be used under the same conditions as petrol. There is nothing to prevent your making a gas trailer, but do not do so until after you have communicated with the Petrol Controller's Department of the Board of Trade, 19, Berkeley Street, London, W.1, regarding a permit. You need to carry a rear light only on the rearmost vehicle, *i.e.*, on the trailer.

Tuning an F.N.

Could you give me a few pointers upon the tuning up of a four-cylinder F.N. a.i.v. for speed? Would you advise timing exhaust valves to close, say, 3 mm. past the top, and also original springs in inlet with 1/32in. opening, or stronger springs, and, say, 1/16in., or even 1/8in.? Would you fit stepped piston rings on top of pistons? Would a modern carburetter be an improvement on the original F.N. for speed? Would the machine tuned up and faked approach 60 m.p.h.? Would it pull a sidecar without a two-speed gear?—A.B.

We think your suggested timing for the F.N. should give satisfactory results, while stronger inlet springs would certainly make for greater speed, but if too strong they might prejudice the ease of starting. The question of stepped or plain end piston rings is largely a matter of opinion, and we do not think there will be much gain in fitting either type over the other. The old F.N. carburetter is, of course, now somewhat out of date, and no doubt a more modern instrument would be a considerable improvement. If the machine were in first-class order and tune it is possible that you might reach 50 m.p.h., but this is a very high speed. If you had your machine tuned up so that it would give this speed it is doubtful if it would pull a sidecar with full satisfaction, as the timing for pulling and that for speed are somewhat different. However, the machine should pull a light sidecar satisfactorily in a fairly level country.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week

Two-stroke Hints.

(1.) I have at present my $2\frac{1}{4}$ h.p. Levis motor cycle down for overhauling and cleaning, and I am thinking of joining the local Motor Volunteers, but I have not yet sent for my local taxation licence; shall I be right if I ride my machine on duty until my licence comes? (2.) Is it advisable to put any oil in the crank case when I re-assemble my machine, and what sort of oil is best? (3.) Do you think I shall get better mileage from present-day petrol if a hot air intake be fitted, and what is the best sort of intake to fit?—A Loyal Reader.

(1.) We should not recommend you to ride the machine until you have all the requisite licences in your possession. (2.) Put about three pumpfuls of air-cooled oil in the crank case of your engine. This cannot do any harm. Any good oil for air-cooled motors will do. (3.) Certainly a hot air intake would improve the consumption and running of the engine. The hot air intake should take the form of a funnel, bringing the warm air from the radiating fins, preferably at the back of the cylinder, into either of the air inlets of the carburetter.

Fitting a New Piston.

Having had the misfortune to irreparably crack the piston of my $3\frac{1}{2}$ h.p. engine, the only pattern piston I can get is $5\frac{1}{2}$ oz. heavier and $\frac{1}{2}$in. shorter in the skirt than the original, but the distance between the top and the gudgeon pin hole is the same. (1.) Will the extra weight of this piston upset the running of my engine? (2.) Is it necessary to have it lightened, and will turning the top concave lower the compression and affect the h.p. in consequence, as I do not like the idea of drilling holes in the sides of the piston unless you advise this? I might say that the suggestion of turning the top concave was given me by the firm supplying it, as the top has ample thickness to allow this to be done. (3.) Will the shortness of the piston be any disadvantage, as half an inch seems rather much? (4.) What sort of fit should a piston be in the cylinder without rings, and do you think this too slack?—that is, when cylinder is laid on its side with the piston in flush, at the bottom I could just get a five-thousandth of an inch feeler in between cylinder and piston at highest point. Should the piston be a friction fit, or do you think this about right?—L.J.H.

(1.) Yes, the extra weight may upset the balance of the engine. (2.) You can easily lighten the piston, not by turning the top concave, which would be distinctly inadvisable and would lower the compression, but by getting the piston turned out inside beyond the bosses through which the gudgeon pin runs, and also round the skirt. There is also no objection to drilling boles round the skirt should this be found to be necessary. (3.) The shortness of the piston within reason should not be a disadvantage. (4.) The piston should not be a friction fit, and the clearance you have appears to be correct. The piston rings should be a snug fit with the joints just closed.

A Leaky Petrol Tank.

I have taken down my tank to repair it. The tank is held on by clips on the top tube and screws. The petrol leaks past the threads of the screws. Would you please let me know how to stop this?—W.P.

You cannot very well solder the screws into the tank, but it must be at the actual sockets into which the screws go that there is a defect. Have you tried soldering all round these? One method of testing for the source of leakage which we have carried out with great success is to block up every orifice in the tank from which air can escape, then solder temporarily into the filler cap a cycle valve complete, and fit your pump on to this, give a few strokes, taking care not to get too much pressure into the tank, and then immerse the whole in water, when the leak will be rendered visible by the presence of bubbles. We may add that the work of soldering petrol tanks is exceedingly dangerous, and we would never recommend an ordinary novice to attempt it.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

Knocking on Hills.

My machine is a $3\frac{1}{2}$ h.p. single fitted with a Philipson pulley. It has a sporting canoelet sidecar, which is very light, attached to it, and is very fast on the level. But when going up a gradient, such as Putney Hill, it begins to konk and slow down considerably, and unless I lower the gear by putting my heel on the pulley it will probably stop, although the spark is retarded and the air lever shut. It seems to me that either the spring is too strong or the gear is too high, in which case please tell me how to lower the gear.—J.L. de V.F.

Either the spring in the pulley is too stiff, thus preventing the gear from responding sufficiently to the impulses of the engine, or the compression of your engine is too high for sidecar use. We would recommend you firstly to reduce the compression by fitting a thicker joint between the crank case and the cylinder, say, a cardboard joint, about $\frac{1}{32}$in. thick, well covered with seccotine. If this fails to cure the knocking, then you should communicate with the makers of the pulley, Messrs. Philipson and Sons, Holland Street Works, Astley Bridge, Bolton, who may possibly be able to supply you with a more flexible spring. The satisfactory working of a Philipson pulley is dependent upon obtaining a spring of the correct tension.

Choked Exhaust Pipe.

My two-stroke starts up well after flooding of the carburetter, but after running for about 300 yards—sometimes more, sometimes less—begins to knock and slow up, and finally knocks itself to a standstill. I decarbonised the cylinder not many weeks ago, so it cannot be carbon that causes the trouble. I have overhauled the magneto, and everything is in perfect order, a fat spark showing every time. No alteration of either timing or petrol level has any effect whatever, and the carburetter has been taken to pieces and thoroughly cleaned. Closing the air lever has no effect, neither does retarding the magneto. I have tried four different types of plug. There appears to be no air leak between the carburetter and induction pipe, and there are no gauzes in it.—H.H.

In all probability your trouble is due to the silencer or exhaust pipe being choked with deposit.

Work of National Importance.

I am doing agricultural repairs, and as I have to carry tools, etc., I am using a sidecar, as I have been allowed a free-of-duty petrol permit. (1.) Must I pay the £1 local taxation licence? (2.) Is it necessary for me to paint my name and address on the sidecar? (3.) If I have a job on which I require assistance, may I take a man with me?—J.W.F.

(1.) On no account pay the local taxation licence if you desire to obtain free-of-duty petrol, provided, of course, that your machine is a genuine sidecarrier, constructed and adapted for the purpose of transporting goods and merchandise. (2.) Of course, you must have your name and address on the outfit, but unless it fulfils the requirements of the Act you will be liable for the local taxation licence, and you will also have to remit to the Petrol Controller's Department the duty due on your free-of-duty permit. (3.) There is no objection to your taking a passenger with you, but the authorities will not accept the machine as a business vehicle if it is fitted with a touring body.

RECOMMENDED ROUTES.

Pembroke Dock to Warwick.—V.J.D.
Pembroke, Carmarthen, Llandilo, Llaudovery, Brecon, Three Cocks, Hay, Willersley, Hereford, Ledbury, Tewkesbury, Evesham, Bidford, Stratford-on-Avon, Warwick.

Salisbury to Nottingham.—R.F.D.
Salisbury, Andover, Whitchurch, Newbury, East Ilsley, Abingdon, Oxford, Banbury, Southam, Rugby, Leicester, Loughborough, Nottingham.

Bristol to Sheffield.—D.F.S.
Bristol, along the Malmesbury Road till you reach the cross road which leads from Bath to Nailsworth, thence through Nailsworth, Stroud, Cheltenham, Cleeve, Evesham, Bidford, Stratford-on-Avon, Warwick, Coventry, Hinckley, Ibstock, Cole Orton, Melbourne, Derby, Ripley, Alfreton, Chesterfield, Sheffield.

FEBRUARY 7TH, 1918.

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AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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NEW ZEALAND—Gordon & Gotch, Ltd., Wellington, Auckland, Christchurch, and Dunedin. INDIA—A. H. Wheeler & Co., Bombay, Allahabad, and Calcutta.
SOUTH AFRICA—Central News Agency, Ltd. PARIS—Smith's English Library, 248 Rue Rivoli.

Reconstruction.

THE problems involved in the work of reconstruction after the war may at first sight appear to be outside the province of a popular technical journal like *The Motor Cycle*, but if we examine them very closely we shall find that, in fact, they have a most intimate connection with the development of the motor cycle movement, and, therefore, are pregnant with interest and importance to our readers. We go further, and say that if these problems are to be readily solved it is essential that the views of the user shall be taken into account as well as those of the manufacturer and the worker engaged in the factory.

The technical press will render an invaluable service to British industries if it will undertake to give expression to the opinions of its readers and ensure that these be taken fully into account when the problems referred to are under consideration.

The demand for motor cycles immediately after the war will be many times greater than the supply. If British manufacturers wish to keep the industry a British one, they must consider without delay the many problems connected with quantity production: the obtaining of the necessary machinery in sufficient quantity and at an early date, the securing of adequate supplies of raw materials, the organisation of labour, the settlement of the wages question, financial facilities (with particular reference to Overseas trade), and generally such improvements in trade organisation as may be necessary for the purposes of more economical production, distribution, and marketing, which latter aspects are obviously of direct personal interest to the user.

It is refreshing to find that the Reconstruction Department of the Ministry is fully alive to the needs of the after-war situation, and that Dr. Addison is enlisting the services of some of the best men in the kingdom in order to deal with the various branches of the problem.

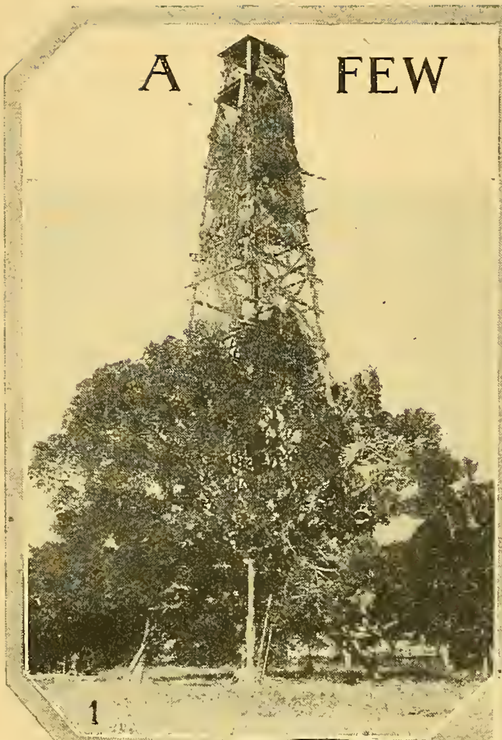
The preservation of industries in danger of extinction, the establishment of new industries, the volume and nature of the demand for British goods, and kindred matters, are all under careful consideration, and the thing of outstanding importance in that connection is that the Government intend to use the men of the industry themselves as far as possible for executive work in the regulation of trade after the war.

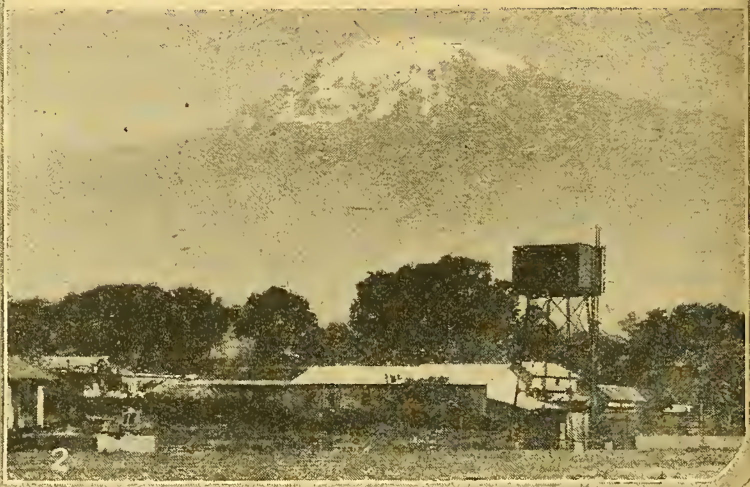
We may add that the Industrial Reconstruction Council has issued a pamphlet entitled "Trade Parliaments," which contains some very pertinent remarks upon this most important subject. In the first place, it says, almost the whole duty of the British nation after the war may be summed up in the phrase "Political and Industrial Reconstruction." Secondly, the business of reconstruction is urgent. It cannot wait. To be ready for peace we must prepare during war. Unless our schemes for industrial reconstruction are well under way when peace is declared, our industrial competitors may easily steal a march on us, and a golden opportunity be lost for ever. Thirdly, each trade has a sphere of almost incalculable importance in creating the new industry of the future.

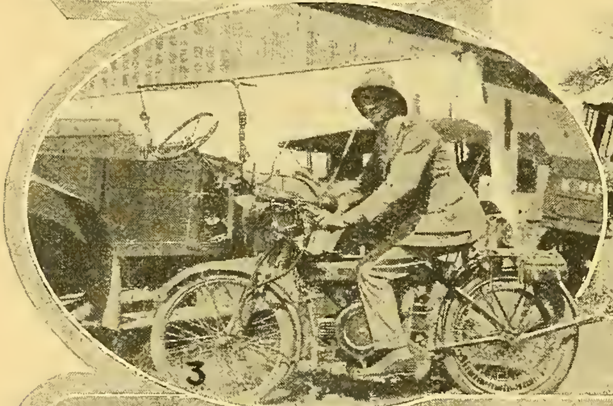
The Government can, and no doubt will, rely upon employers' associations for information on purely trade questions. But more than this will be necessary if British industries are to be developed upon the right lines. We must have the users' side of the matter adequately considered, and, if need be, protected. Labour will certainly insist upon full recognition. Why should not the motor cycle industry give a lead to other industries by the formation of a council, upon which should be represented the manufacturer, the workman, and the user? In effect, an industrial council on the lines recommended in the Whitley Report, but providing for the outside-the-factory point of view, represented by the user. Much benefit might come of it—not only for the industry, but for the movement as a whole.

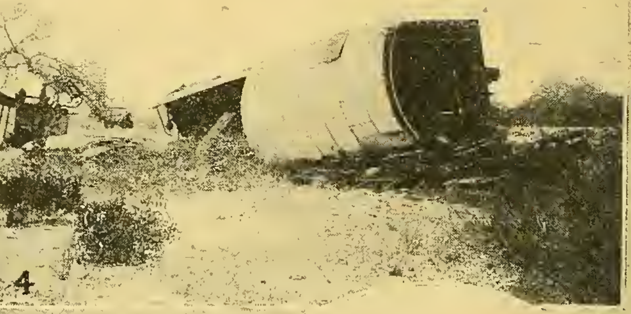
An Index to the advertisements in this issue will be found on the page facing the back cover

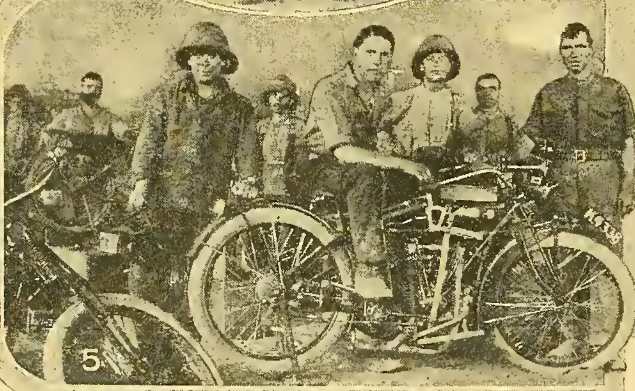
A FEW REMINISCENCES OF THE CAMPAIGN IN G.E.A.

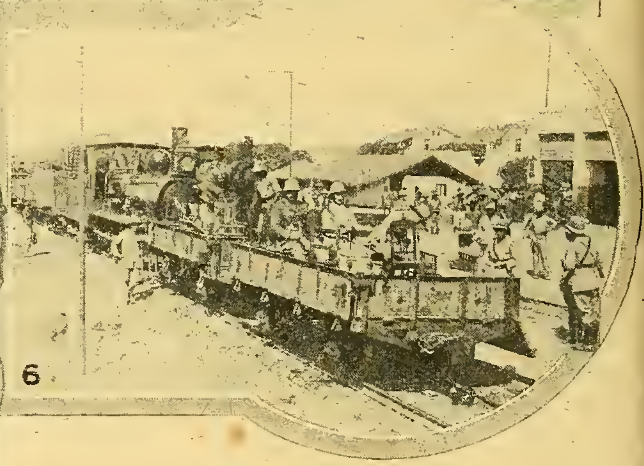












(1) A German look-out tower at Dar-es-Salaam.

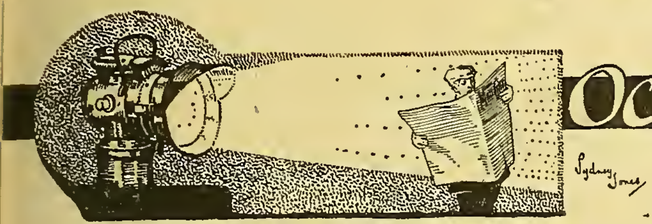
(3) J. D. Mail (Sgt. Mechanic) aboard his Douglas at M.T. Workshops, Dar-es-Salaam.

(5) A group of mechanics in a motor cycle workshop at Dar-es-Salaam. The Indian motor cycle was the first to be used on active service in G.E.A., and did excellent work.

(2) Mt. Kilimanjaro, the highest mountain in Africa. The ground in this neighbourhood is very heavy for motor cycles owing to the perpetual mud.

(4) An enemy train which was bombed by aircraft and derailed whilst in motion near Dodoma.

(6) Gen. Van de Venter on an inspection train near Dodoma.



Occasional Comments

"By Ixion"

The Tandem-seated Cycle Car.

ONE or two designers are wondering whether the public will or will not accept a tandem-seated cycle car after the war. It is evident that this design has peculiar advantages from the standpoint of wind resistance, improves the prospects of fast hill-climbing with a small engine, and thereby eases the problems of air-cooling. I was asked my opinion last week, and the hesitating designer laid great stress on the popularity of pillion riding ("flapper brackets"), and on the fact that thousands of young men have grown accustomed to tandem-seating in biplanes. The cases are not on all fours. The occupant of the flapper bracket can talk to you quite easily, as her lips are very near your ear. In an aeroplane the uproar forbids conversation, even if side by side seating were possible. There are two grave arguments against tandem seating. The first is mechanical: unless you employ wide axles the vehicle is laterally unstable, and if you fit wide axles the appearance is abominable. The second is practical: other designers will undoubtedly market good cycle cars with side-by-side seating. On the whole, I think the idea is *na poo.*

About Piston Rings.

"CHINOOK" launches us on rather an uncharted sea when he opens the question of the piston ring of to-morrow. The type which has a narrow face, bearing on the cylinder wall, and is bedded deeply into the piston grooves, is undoubtedly sound: not only does it reduce leakage through the groove round the back of the ring, as he states, but it also has a better chance of keeping the whole of its friction face bearing on the cylinder walls. This apparently small point secures rather important consequences. It prevents the exploding charge from blowing past the rings so readily, and it cuts down friction by eliminating the oil-wedging tendency, to which I recently drew attention. But the number and size and location of the rings, so far as future motor cycle engines are concerned, will depend enormously on the metals employed for pistons and cylinders. I think we may wash the obturator ring out: at its best it was an infernal nuisance, and it owed its genesis to the use of badly designed cylinders, which distorted atrociously—a fault which is now mastered. The motor cycle designer of the near future will not be afraid of distortion, but he may be troubled by his piston and his cylinder expanding in different ratios. He may be prepared to tolerate this varying rate of expansion, because of the improved cooling or reduction in the weight of reciprocating parts which it gives him. If he so tolerate it, he will have to take stringent precautions against gas blowing past his piston. Such precautions might take the form of a single ring, equipped with one of the modern "joints" which is not a "gap," as well as a joint—the ordinary 45° diagonal split, of course, was simply a gap. We can hardly speculate about the piston ring of the future, until we know of what materials the commercial motor cycle piston and cylinder will be. Personally, I am of opinion that it is not much use trying to cut down piston friction on motor cycles until we get rid of our crude lubricating systems. At present our pistons have to shoulder their way through a huge sludge of surplus oil. Given proper cooling, we shall not need a fifth of the quantity of oil. Given less oil, we can begin to talk of reducing ring friction.

The Ricardo Piston.

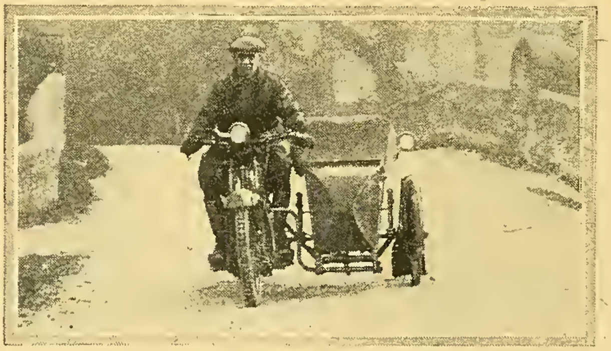
I DARESAY some of our readers have yet to strike the Ricardo piston, though they may be familiar with its name. The cognoscenti will forgive me if I explain its peculiarities. Everybody knows that when a cylinder wears in prolonged use it wears oval, instead of, *e.g.*, expanding an originally circular bore of, say, 85 mm. diameter into an enlarged circle of 86 mm. diameter. The reason for this wearing oval, of course, is that the crank pin travel subjects the front and back of the cylinder (when the crankshaft runs athwart the cycle) to far more pressure than the right and left-hand sides of the cylinder. The Ricardo piston has approximately the usual depth of skirt at its back and front, *i.e.*, on its "pressure" sides. But the skirt is cut away on the two non-pressure sides, so that on those sides there is no metal worth speaking of below the "land" on which the rings are mounted. This is an extension of an idea first applied to motor cycle engines, I fancy, by the Rudge people. They found that their early flush-sided pistons, which were very light, used to distort. So they recessed a broad waistband all round the skirt, with the result that if the waist distorted it did not touch the cylinder walls at any point. The patent Zephyr piston carried the same idea a stage further, for it had an hour-glass contour, and was an improvement on the Rudge: if a Rudge engine was over-oiled, the shallow recess in its waist simply acted as an oil trap, imprisoned a film of oil shaped like a napkin ring, and slid it up and down. These experiments gradually taught engineers that engines suffered much from two unsuspected causes of friction. The one was a sticky film of oil between the entire surface of a flush-sided piston and the cylinder wall, which had to be forcibly "sheared," and acted as a drag on the piston, even though it helped to keep things cool. The other was that piston rings might maintain compression-tightness, but they often served as oil wedges, too. The old flush-sided piston is as dead as a door-nail. The old heavy oil sludge will slowly follow it into oblivion. Alterations in piston rings will follow upon these changes, and are now only waiting—as far as motor cycle engines are concerned—for peace to determine our cylinder and piston metals. In which connection we must realise that the cast iron cylinder is also obsolete and past resurrection.

THE FIRST 1000 MILES on a MILITARY MODEL A.J.S.

Notes on the Running of a Popular Outfit.

EVERYONE knows that the A.J.S. is not a speed merchant's mount. With its sidecar attached, it is as fast as most riders require, pulls well on hills, is delightful to control, and requires no attention whatever. The aim of the makers has been to obtain absolute reliability, weatherproofness, and tractability—to produce a thoroughly serviceable mount which will meet with the thorough approval of riders of ordinary engineering ability. A noble attempt has been made at efficient mudguarding, and, except in the vilest of winter weather, one keeps spotless. When the roads are a-swill, however, nothing short of leg shield will keep one clean on any mount, and even with the A.J.S. sensible front wheel mudguard a certain amount of splash blows back on to the knees of the rider.

On first taking delivery of the new machine sundry carburetter adjustments, described later, were necessary ere it began to shed its lethargical attitude towards anything in the way of hard work. Then came a long run to the West of England and back, taken pretty well all out with a veritable rhinoceros and his luggage in the sidecar. This had the desired effect of freeing things up, and the engine began to take a new interest in life. Though its maximum is about 42 m.p.h. on the level, it will hold an average of 32 m.p.h. without great effort. In other words, and in common with one or two mounts of similar type, the A.J.S. is a slow machine on a short journey, but a fast machine on a long journey!



The military model A.J.S. on which the 1,000 miles test was accomplished.

I have always regarded the A.J.S. as rather under-engined for a heavy sidecar mount, but what it lacks in actual c.c. it makes up in what one might term "general pluck." No matter how hard and difficult the going, it is ever ready to get off the mark on its top gear immediately the severity of the conditions relents in the least degree, and normally it possesses a surprising degree of ginger in tackling gradients. The only time at which one becomes conscious of the engine being slightly on the small side is when carrying an extra heavy passenger in the sidecar. Every pound over 10 stone begins to tell on the gradients, whereas with an engine on or about the 1,000 c.c. mark it makes no perceptible difference to the road speed whether the passenger be 10 stone or 14 stone.

A 30 jet is used in the Amac carburetter, which is tuned for high "revs" and sturdy pulling rather than economy and a slow tick over, yet with passenger the petrol consumption usually centres about 78 m.p.g.

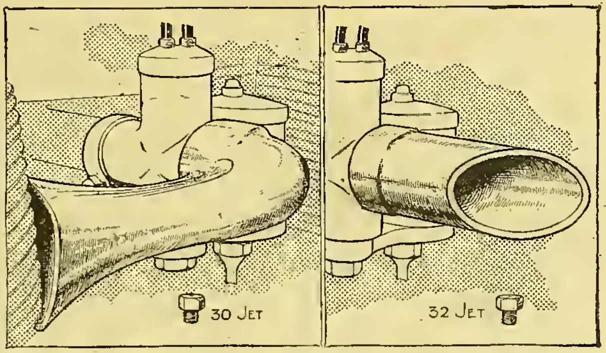
It may be added that, immediately after the ride to the West of England, the cylinders and pistons were carefully gauged, and were found to have retained their rotundity, the back cylinder being perfect, while the front was so slightly out of truth as almost to defy observation.

As turned out by the makers, the carburetter is fitted with a neat aluminium hot air intake, drawing its supply through the front cylinder fins. This is doubtless a wise provision, especially as the machines were designed for use in Russia, but a hot air intake on an air-cooled engine inevitably detracts from the

The First 1,000 Miles on a Military Model A.J.S.—

"revving" capabilities of the engine. This particular one was fitted internally with a double thickness of gauze, the disc being of rather narrow diameter, with the result that it simply did not admit sufficient air for high revs.—what little it did admit being expanded by the heat. The volumetric efficiency of the engine was thus knocked down, though by employing a small jet one could obtain marvellous petrol consumption and a beautifully slow tick over.

This, then, accounted for the sluggishness of the engine in delivery tune, and was possibly a state of affairs wisely arranged for the benefit of the hairy Cossack. I pulled out the gauze, and at once discovered that the engine would take no air at all. The next obvious thing to do was to fit a larger jet, and the thirty gave good results with the hot air intake fitted. When in a skittish mood I removed the hot air intake, fitted a rubber scoop to the main air supply, substituted a thirty-two jet for the thirty, and pulled out the two little extension pipes from the silencer. Result—colossal kick!



(Left) The A.J.S. hot air intake, which, used in conjunction with a thirty jet, gives ordinarily economical running. (Right) By fitting a rubber hose air scoop and using a larger jet more power and higher revs. are obtained.

It may be added that in tuning a carburetter, petrol level must be considered in conjunction with the size of jet used.

The engine has proved conveniently indifferent as to the fuel it consumes. On No. 2 petrol it invariably starts second kick after flooding. On half substitute and half petrol it is necessary to flood twice and kick four times. On one occasion I was reduced to paraffin with the merest smell of petrol—and that on a frosty night. After flooding six times and kicking sixty-two times, I induced a wayside watchman to lend me some of his coffee to pour over the induction pipe, after which the first kick did it.

A Mudguarding Indiscretion.

Though the chain cases permit a reasonable degree of accessibility, which is further added to by the system of interchangeable wheels, I cannot speak very highly of their weatherproofness. Recently, after a spell of abnormally muddy weather, the kick-starter threatened to strike work, so I removed the front cover to investigate. To my surprise both chains were dry of oil, while the front chain was literally wallowing in a stiff solution of mud and water—conditions infinitely worse than those to which a totally exposed chain is subjected. A considerable accumulation of stiff mud, through which the clutch sprocket had ploughed a groove, was removed from the inside of the cases, which were then washed out as well as possible, and a pound of stiff grease inserted.

This state of affairs was found to be mainly owing to an indiscretion in the design of the rear wheel mudguard—a point quite out of harmony with the general detail care and thoroughness exhibited in most minor points. The wide rear wheel mudguard overlaps the chain case, so that at the point at which they come in contact the torrent of mud from the inside of the guard naturally drains itself on the top of the case—and at its most vulnerable point—the thin slush percolating through the chinks and the joint through which the left chain stay emerges. The lip of the front chain case cover fits outside instead of inside, so that mud and water contrive to get through it, and at the top of the cover is a small recess in which quite a spacious puddle is free to collect, duly draining itself through the joint.

The more one has to do with chain cases the more convinced does one become that the only variety that warrants its existence is the cast aluminium type. However, by bending the guard so as to divert the stream of mud inside the case, the trouble referred to has practically been eliminated.

It is customary in these days to lubricate the chains by the overflow from the engine, but for some reason the A.J.S. people have eschewed this system. With a chain-cum-belt drive it certainly has its defects, but I see no objection to it when all enclosed chains are used, and the system tends to safety in the hands of the ordinarily forgetful rider. With the A.J.S. it seems to me the best plan is to cram handfuls of stiff grease through the observation holes at regular intervals, trusting that centrifugal force will keep the clutch plates fairly clear.

Features of the Military Model.

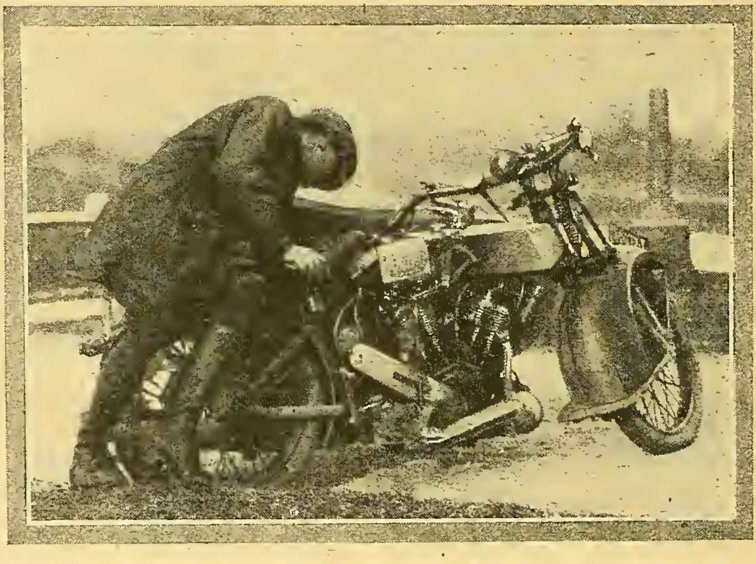
The mount is, of course, a Russian military model, having the increased ground clearance, 700 × 80 mm. tyres, and long magneto drive laid down by the Russian specialists. The last point is simply a polite way of asking for trouble in the direction of a slack magneto drive and worn bearings. The A.J.S. design was the result of a decade of experience, and one cannot help but feel that the authorities responsible for the change might have done well to consult the opinion of firms who knew their business before forcing them to undertake radical alterations in design. The increased ground clearance is a good point in this case, as it does not hinder the speedy removal of the cylinders, but, in company with the large, squashy tyres, it renders the machine rather an unpractical proposition for solo use. Coventry possesses a highly efficient brand of grease of its own, created by the incessant flow of traffic necessary for the distribution of thousands of copies of *The Motor Cycle* and its sister journals, and riding the A.J.S. solo over the tramlines proved an undertaking eminently suitable for contortionists and acrobats.

The large wheels and tyres are, however, a huge acquisition over present-day roads. One can ride fast over the potholes without experiencing the least discomfort, the spring forks functioning excellently, and with sidecar attached the propensity towards sideslip does not matter in the least. The rear brake of the A.J.S. is rightly famous.

The First 1,000 Miles on a Military Model A.J.S.—

The engine of the A.J.S. is remarkably silent, both as regards valve mechanism and exhaust. There is none of that deafening valve clatter at high speeds common with many twins, and when throttled down in traffic the engine runs like a Rolls-Royce. It is a highly desirable type of mount for every class of rider who delights in smooth running, reliability, and an absolute no-trouble mount. The clutch is one of the kindest I have handled. It is difficult, indeed, to obtain anything but a smooth engagement, and being adjacent to the rider's hand it can be utilised as a shock absorber at low speeds.

It will be recalled that the A.J.S. people abandoned the use of the engine-shaft friction shock absorber (fibre to metal) on account of the fact that they discovered its correct adjustment caused more trouble to "the average rider" than its existence warranted. This may have been a wise step, but at the same time there is no getting away from the fact that a friction shock absorber is highly desirable with a positive transmission, and though on wet roads its necessity is not felt, the drive is inevitably harsh without it on dry roads. The idea of using the clutch instead is perhaps simple, but it must be borne in mind that one generally forgets to use the clutch till the snatchiness of the drive warns one to do so, by which time the worst snatches have probably been delivered and the necessity of a shock absorber is diminishing. Moreover, it is not a difficult matter to arrive at a spring friction shock absorber which requires no adjustment whatever—is, in fact, unadjustable.



Adjusting the carburetter. The picture prompts the question which many sidecarists have put, "Why are parts which need adjusting placed on the inaccessible side of the machine?"

The Thomson-Bennett magneto is a fine instrument, which contributes largely to the characteristically easy start obtainable. The engine will start even when so stiff that one can hardly kick it over compression, and on coal gas can be throttled down to a scarcely audible tick.

The Mills-Fulford "Corvette" sidecar is comfortable and well sprung—an excellent piece of work which demands only a spring luggage grid. The windscreen first fitted got rather into the way of the wide semi-T.T. bars, so it was removed, whereupon we discovered that with the hood erected the passenger was much better sheltered without the screen than with it. In fact, it was a doubtful blessing at any time, the hood fully meeting requirements in wet weather, and it may be added that the sidecar rides much more comfortably with the hood erected than with it down—the hood steadying the rebound. This points to the desirability of yet another friction shock absorber.

A Ward and Goldstone accumulator lighting set was installed, but since this has already been fully described it may be passed by with the comment that it has proved entirely satisfactory, and gives sufficient light for war-time requirements. The Bonniksen speedometer is an excellent instrument of infallible accuracy. It registers the exact m.p.h., even when one is pushing the machine across the yard into the garage, while it is a huge advantage at high speeds to enjoy the facility of reading an absolutely stationary needle, which hits the mark and stays there for a few seconds, till its place is taken by its neighbour.

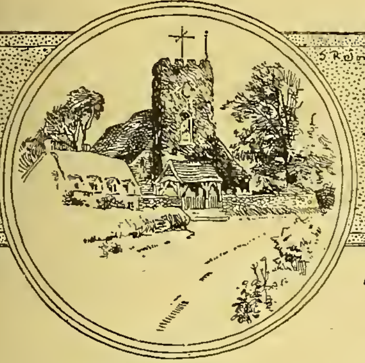
A Few Candid Criticisms.

It will be recalled that in the latest model A.J.S. a truly triangulate frame construction is employed, and this excellent feature necessitates the flat-topped tank with its cleanly exterior, there being no top bar under which dirt and oil can collect. Incidentally, no petrol gauge is necessary with this type of tank; when only half a gallon is left it gives off a faint base rumble, which I have mistaken for an aeroplane passing near, and as the supply sinks to a quarter-gallon the sound is reminiscent of a boy scouts' band in the far distance.

I have no intention, and there is certainly no need, to sing the praises of this world-renowned machine, so now for a few criticisms. The foot plates are a shade too far forward for long-distance riding, with the result that one acquires the habit of sitting with one's instep on the elevated heel, which is bad for the instep, and worse for the side of one's boot, which is constantly chafing against the jagged points of the clutch-operating mechanism. No doubt by curling one's foot in a special way one can avoid the mishap, just as, I have heard, one can drink paraffin without nausea by curling one's tongue in a special position, but—why drink paraffin?

War-time tank stoppers leak enough petrol to run an Auto-wheel, and, as for war-time toolbags——! But the A.J.S. is a thoroughly sound mechanical job, the workmanship and design being of the highest order, and obviously the result of long experience among practical riders and engineers—facts which are perhaps proved by the high second-hand value these machines maintain—a sure indication of the public attitude towards them.

CHINOOK.

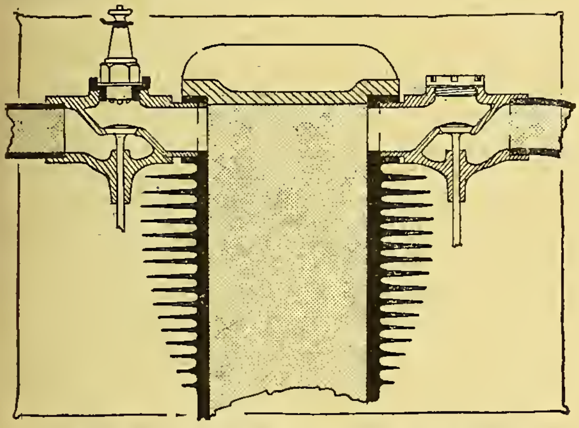


A SYMMETRICAL CYLINDER

How to Avoid Heat Distortion.

THAT advantages would accrue from having a plain symmetrical cylinder instead of the accepted lop-sided arrangement has long been admitted.

The cylinder with overhanging valve pockets is liable to distortion during casting, and when in use under severe conditions, and with the unequal distribution of heat which always obtains, distortion in a greater or less degree is certain.



Detachable valve pockets, to be screwed or bolted on the cylinder casting.

Yet notwithstanding the fact that all these things are perfectly well known, little, if any, alteration to design has resulted. It is not, of course, possible for any radical departures from usual practice to take place until after the war is over. The point which interests us, however, is, Will there be an alteration in design after the war, or has finality been reached in this direction?

One is probably safe in saying that as regards distortion and overheating of the exhaust valve the cylinder with overhead valves comes out better than the side-by-side type.

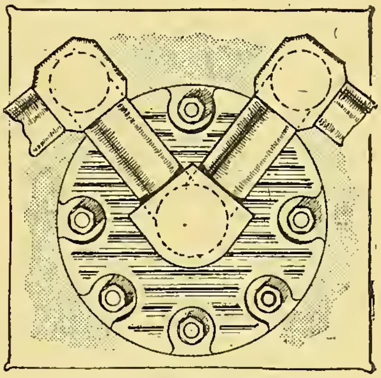
Similarly, cylinders fitted with concentric valves and a movable seat, as illustrated in *The Motor Cycle* some months ago, would be a still greater improvement. This type of engine, however, does not seem to materialise in practice.

Following the above, the Blackburne would appear to be a considerable advance over the old design of engine.

If the subject is studied further one inevitably comes to the conclusion that the only method of obtaining a clean and symmetrical cylinder is to detach the valve pockets and make separate castings of them.

Detachable Valve Pockets.

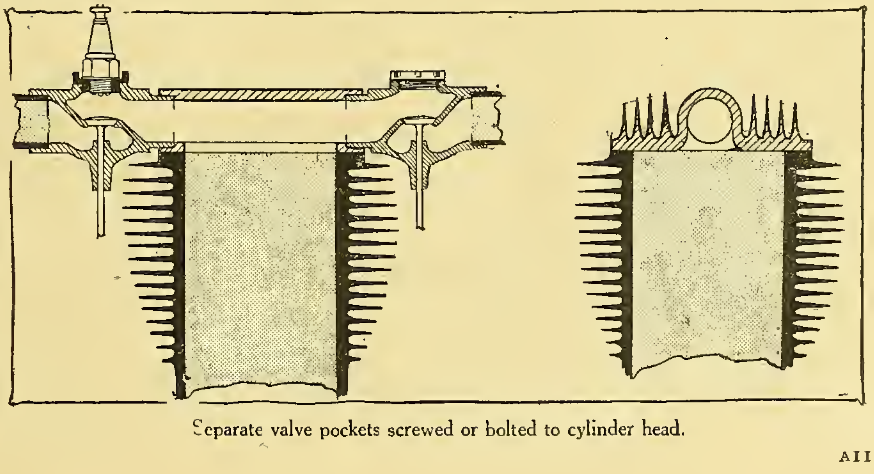
Diagrams are here given showing what would be the result of doing this. There are a few points which it may be wise to notice. The valves and pockets may be placed in a number of alternative positions, according to the wish of the designer, either to suit his valve gear or to obtain a preconceived method of heat distribution. With regard to the latter, for instance, there are certain attractions about putting the inlet valve on a level with the top of the piston when it is at the bottom of its stroke, thus introducing the cool mixture to the centre of the cylinder and on to the top of the piston head.



Plan of an arrangement which lends itself to existing valve gear.

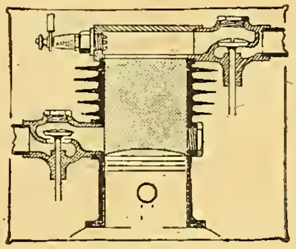
As regards the construction of the valve pockets, it may be found that these can be made of a lighter yet stronger material than cast iron.

It will be seen that an advantage would be that one could carry a spare valve pocket and valve complete. The latter would be already ground in, and a change could be made on the road, or at any time, and the old valve and pocket reground comfortably at the bench.



Separate valve pockets screwed or bolted to cylinder head.

A Symmetrical Cylinder.—In the diagrams a detachable cylinder head has been shown allowing easy access to the cylinder and piston for decarbonising purposes. The valve pockets could be used, of course, with an ordinary closed cylinder. The exhaust valve would be subject to a maximum of cooling by reason of the exhaust valve pocket being practically surrounded by fresh air, and it might be assisted by the addition of radiator fins to the valve pocket.



The alternative position for the inlet valve referred to on previous page.

As regards manufacture, one would think that an engine with detachable valve pockets would be turned out cheaper in quantities than would an engine with pockets cast integral with the cylinder.

Certain practical objections may be raised to this system of arranging the valves, but there is no doubt that any manufacturer convinced of the advantages to be obtained would make short work of these.

ENGRO.

AMERICAN RECORDS IN 1917.

Interesting News of American Motor Cycling Events during the Past Year.

OUR American correspondent, in sending the compiled motor cycle records in the United States for last year, prefaces them with the following characteristic comments, which read truly American:

"You may take it from me you will not see much more activity in motor cycling until the curl has been taken out of the Kaiser's moustache.

"We surely are getting into our stride over here, and profiting by your mistakes, most willingly pointed out to us; we are speeding up by the minute. If I could but tell you all that you may see—but it's best to keep quiet: we've too many Huns over here with ears cocked to the windward for stray bits of information now.

"Wait until we get our first casualty lists—we're gonna see some damage done the lukewarm Toots in our land as sure as gun's iron. Damit! we let 'em print and talk German yet, but it's gonna stop—wonder if these sentiments are too much red-fired stuff?" It is good to hear that the U.S.A. are getting into their stride; there is consolation, too, in the fact that someone will profit by our mistakes, though there is irony in the statement.

LONG DISTANCE AND TWENTY-FOUR HOUR RECORD TRIALS IN UNITED STATES, 1917.

January 3rd-4th.—Roy Artley (Henderson sc.), 707 miles in 21h. 18m. over 108 mile course on public highway in California. Average, 35 m.p.h.

March 1st-2nd.—Don Johns (Indian sc.), 797 miles in 22h. 27m. over 90 mile course on public highway in California. Average, 35.35 m.p.h.

March 26th-27th.—Alan T. Bedell (Harley-Davidson solo), 1,000 miles in 20h. 42m. 30s., 1,153.5 miles in 24h., on Ascott Track, Los Angeles, California. Average speed, 48.06 m.p.h.

June 8th-9th.—Lt. E. F. Hoffmann, U.S.A. (Indian sc.), 963.6 miles in 22h. 0m. 4s. over 20 mile course, El Centro, California. Average speed, 43.68 m.p.h.

June 5th-13th.—Alan T. Bedell (Henderson solo), Los Angeles-New York City, 3,296 miles in 7d. 16h. 16m., breaking Baker's Indian record by 92h. Bedell rode 127h. 46m., averaging 25.8 m.p.h.

June 19th-20th.—C. F. Bruschi (Harley-Davidson sc.), 1,000 miles in 20h. 39m. over 20 mile course, El Centro, California, averaging 48.42 m.p.h.

June 26th-27th.—E. G. Baker (Indian solo), 1,386.25 miles in 24h., 1,000 miles in 17h. 26m. 30s., 500 miles in 8h. 38m. 31s. Average speed, 61.79 m.p.h.

July 17th-20th.—Roy Artley (Henderson solo), Three Flag Record, Blaine, Wash., to Tia Juana, Mex., 1,667 miles in 72h. 25m., breaking Baker's Indian record by 8h. 50m. Artley made continuous ride record of 34h. 45m. Average speed, 23.01 m.p.h.

July 19th-20th.—"Red" Parkhurst (Harley-Davidson solo), 1,452.75 miles in 20h. 15m. on Sheepshead Speedway, 1,000 miles in 17h. 8m. 28s., 500 miles in 7h. 35m. 17s. Off track 2h. (rain). Average speed, 72.24 m.p.h.—Otto Walker (Harley-Davidson sc.), 1,158.75 miles in 22h. 36m., 1,000 miles in 20h. 22m. 46s., 500 miles in 9h. 47m. 4s. Average, 48.54 m.p.h.

August 14th-15th.—E. G. Baker (Indian solo), 1,534.5 miles in 21h. 37m. on Cincinnati Speedway, 1,000 miles in 16h. 14m. 15s., 500 miles in 6h. 59m. 15s. Average, 70.9 m.p.h.—Teddy Carroll (Indian sc.), 1,275.9 miles in 24h., 1,000 miles in 18h. 48m. 20s., 500 miles in 8h. 56m. Average speed, 53.6 m.p.h. (These are the highest figures over the twenty-four hour route to date.)

September 11th-13th.—Jos. B. Werner (Harley-Davidson sc.), New York-Chicago, 932.6 miles, 44h. 14m. Average speed, elapsed time, 20.55 m.p.h. Werner holds continuous driving record of 44h. 14m.

September 20th-26th.—E. G. Baker (Indian solo), New York-Los Angeles (failed), 2,755 miles in 5d. 8h. New York-Indianapolis, 802 miles, 22h. 10m.

November 15th-17th.—E. T. Buck (Indian sc.), New York-Chicago, 932.6 miles, 43h. 20m. Both this and Werner's ride were continuous drives.

November 20th-21st.—G. C. Austin (Cleveland lightweight), Seattle-Everett, 32 mile course, 542.4 miles, 20h. 26m. Rain and fog. Average, 26.25 m.p.h.

December 5th-6th.—Albert Burns (Indian lightweight), Seattle-Everett course, 552 miles, 23h. 43m. Average speed, 23.24 m.p.h. Worse weather conditions than previous attempt.

THE PRICE of THE MOTOR CYCLE *NOW RAISED TO THREEPENCE.*

Commencing with this issue the price of "THE MOTOR CYCLE" is raised to 3d. a copy.

This further increase is necessary owing to the drastic restriction imposed on the import of paper and paper making materials during 1918 and the consequent heavy advance in the cost of paper, but the price will be reduced as soon as circumstances permit.

The subscription rates are correspondingly raised on renewal or to new subscribers:

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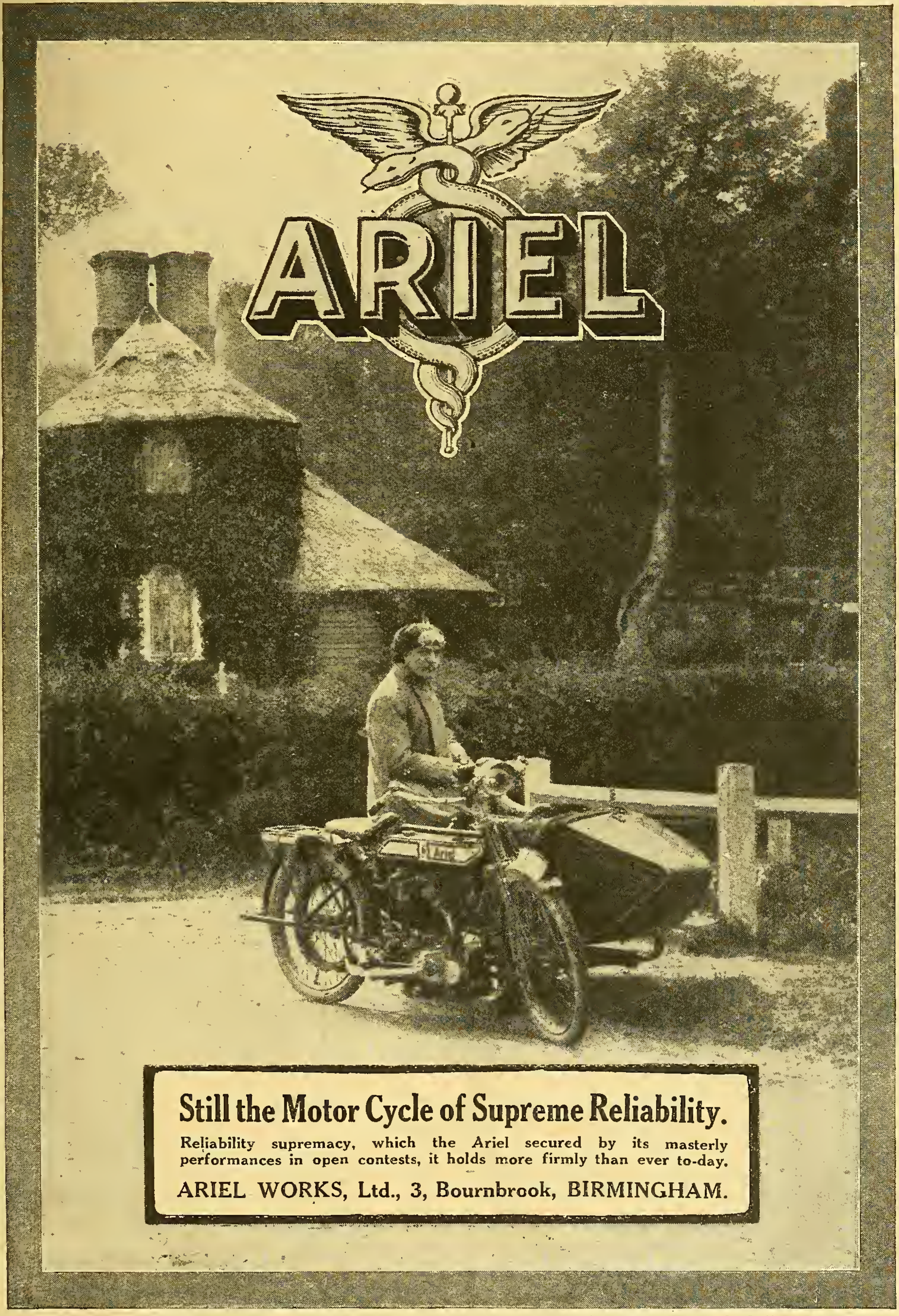

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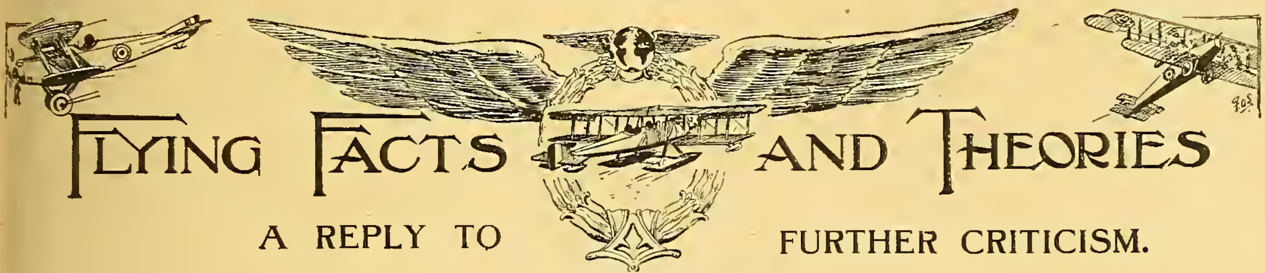


FLYING FACTS AND THEORIES

A REPLY TO FURTHER CRITICISM.

By W. G. ASTON, A.M.I.A.E.

I HAVE to thank several correspondents for their appreciative criticism of my articles, especially the writers of the three letters in the issue of *The Motor Cycle* for January 24th. In the same issue a further article appeared entitled, "The Feel of the Machine," which to a certain extent answers most of the points raised, but the matter is of sufficient interest, I think, to justify a reply *seriatim et privatim.* First of all, I would wish to point out that this heading, "The Feel of the Machine," is a quotation, and, in point of fact, is an expression with which I find it difficult to agree. My question, "After all, what *is* the feel of the machine?" is scarcely answered by "Jacobus, R.F.C.," who writes very interesting and informative details concerning the *feel of the pilot,* which, I would submit, is a distinction with a difference, though I will not deny that "O.J.F.S.," "Jacobus, R.F.C.," and myself are all referring to one and the same thing.

The important point, however, is this, that this "feel" is entirely dependent upon the sensitiveness of the aviator, and, therefore, involves a personal equation which cannot be accurately recorded for purposes of reference. Thus one will find a machine damned by a pilot because it is "heavy on the controls," whereas another will equally strongly, and equally credibly, assert that it is "light on the controls." It is always desirable to avoid inexactitudes of this nature, and for that reason I feel that it is probably better, during the training of a pilot, that he should learn to associate his sensations with the readings of an invariable instrument such as a "bubble," since this association will become a sort of natural calibration. I am well aware that a good pilot is perfectly at home, in most circumstances, on a machine entirely innocent of instruments, but such "stars" are generally men of unusually keen perception, and cannot be regarded as the rule. My own personal view is that the average pilot flies better with instruments than without them, though in this I am very likely at variance with better qualified opinion.

Sensations during a Turn.

As "Jacobus, R.F.C.," pointed out, putting into different words the same thing that I had said in another part of the same issue of *The Motor Cycle,* "If the turn is correctly carried out (*i.e.,* correct proportion of rudder and bank), the pilot experiences a sensation of being pushed hard against his seat." It is for this reason that an aeroplane tends to stall more easily on a turn than when flying straight. If the pilot presses more heavily on his seat, the seat must obviously press more heavily on the aeroplane, and the same applying to all other weights supported in it, it follows that the total effect is that the aeroplane presses more heavily on the air. In other words, its effective weight on a turn is greater, owing to centrifugal force, than when flying straight. That being the case, one of two things must happen if the speed of the machine is to remain constant. Either more thrust must be obtained from the engine or the requisite energy must be obtained, by a loss in altitude, from the only other source, namely, gravity.

If both the same height and the same speed are demanded on a turn as on a straight, then the engine *must* be opened up—there are simply no two ways about it.

Stalling is more likely to occur on a turn because of this centrifugal addition to the weight of the machine. If weight is increased and speed kept constant, the angle of incidence of the main supporting surfaces must be proportionately increased, so that a greater volume of air per unit of time may be accelerated downwards. The object of a curved-section lifting surface is to coax the air to follow the upper surface (from which the greater part of the lift is derived), as well as to force it to follow the lower surface. This idea is illustrated in the accompanying diagram, fig. 1.

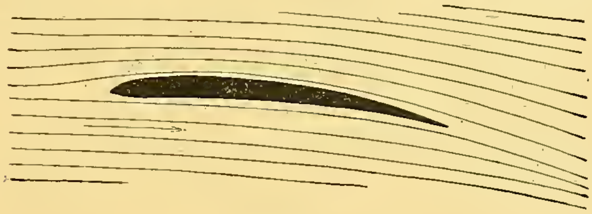


Fig. 1.

"Dead" Air.

Now, if the angle of incidence be increased, the air will have more and more reluctance in following the curvature of the upper plane surface, until a point is reached when the flow ceases to be continuous, and large surfaces of discontinuity are formed. This is shown in fig. 2. The dotted area represents a region of "dead" air, which tends to make a wake behind

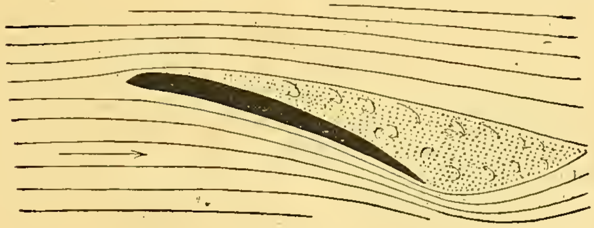


Fig. 2.

the plane, and is full of eddies and turbulence. When this discontinuous flow takes place, it has two immediate and important effects. Firstly, it enormously increases the resistance of the plane; secondly, it equally greatly decreases the lift. The result is that both factors mutually support one another in reducing the speed of the aeroplane, to counteract which it is forced to dive earthwards in order to regain the necessary supporting speed. A third result of the lack of uniformity in flow is that the centre of pressure, *i.e.*, the point through which the lift force is considered to be acting, instead of having a definite position along the section, becomes very indeterminate, and, further, small changes in angle of incidence are liable to cause large changes in its position. This means that when a machine "stalls" it is impossible to get control over it with the usual organs—rudder, elevator, and flaps. In fact, until the centre of pressure becomes fairly determinate in position, the aeroplane may be said to have a total lack of any directive sense, and, consequently, simply drops until sufficient air reaction is set up to provide forces whose effects can be dealt with by the ordinary means of control.

It is for this reason that executing turns near the ground with a failing engine is so dangerous, having regard to the fact that, if a stall occur, there is insufficient room for the aeroplane to perform its act of recovery. Given sufficient height above the ground, no manœuvre or evolution whatever need be a source of danger, provided always that strains beyond the strength of the machine are not imposed.

Flap Resistance.

As I showed in the original article which has evoked so much criticism, to turn "up wind" is likely to make the pilot think he is underbanking. His tendency will be to overbank, therefore, and, in addition, to make a very sharp turn, which, by increasing the load on the wings, is liable to promote a "stall."

"L.B., R.A.M.C.," mentions that on a turn an aeroplane will demand more power to keep it at a definite speed, since the altered position of the ailerons ("flaps" is a much better word, though I understand the other is officially more approved) imposes an additional resistance to motion. This, to a certain extent, is true, but it is a secondary effect only, and, therefore, I did not deal with it in the original article. In aeronautics one subject is often very intimately related with another, and consequently, with a limited space at one's disposal, it is very difficult—nay, impossible—to deal with one particular consideration and all its connections, hence secondary effects have sometimes had to be temporarily ignored.

The question of flap resistance is not necessarily raised in this case, because it is perfectly easy on a stable machine to make turns without interfering with the flaps at all—lateral stability (as dictated by suitable fin and body area) looks after the "banking," and the pilot has only to operate the rudder—these organs being called into action only in case quick turns are demanded. Thus, in a large number of machines, as many of my correspondents are aware, the passenger is furnished with sufficient dual control to let him take charge in case of need, but this control only relates to the rudder and elevator.

As far as flaps are concerned, since these do not give a truly helical formation to the main plane, I think it may be admitted that they, inevitably, must result in greater head resistance, but it is by no means so obvious that the same is the case with a properly designed wing-warping arrangement. It is true that, whilst the drag of one wing is increased, the drag of the other is proportionately decreased, and there is no gain in that direction, but, on the other hand, the two wing tips have different speeds, though their *average* speed is that of the centre of gravity of the machine as a whole. In this connection, therefore, it is a question of how much the warping alters the lift-drag ratio at various points along the wing. I *think* that here the warping idea possesses a certain advantage, but constructionally it is inferior to the flap.

Mr. W. T. Langman disposes of the question of turning "up" and "down" wind with a brevity that is admirable.

Returning to the question of turning, here is a proposition. Given two exactly similar machines, which start from the same height with the engine cut off, and which are to touch ground with the same landing speed (wind neglected); which will get to earth first, that which descends (part of the way) in a spinning nose dive, or that which descends with a straight dive? I shall look forward with great interest to solutions of this problem from practical pilots.

DEATH OF MR. H. WALTER STANER.

A Severe Loss to "The Motor Cycle."

It is with a sense of sorrow and sincere regret that we have to announce the death of Mr. H. Walter Staner, editor of *The Autocar*, and supervising editor of all Iliffe and Sons' motoring publications. Mr. Staner has been on the staff of *The Autocar* since its foundation in 1895, prior to which he was on the staff of *The Cyclist*. Having been responsible for the paper for the preceding twelve months, he became editor of *The Autocar* in 1901, since which time he has held a highly influential position in the sphere of engineering journalism. His name has carried great weight on mechanical matters throughout the motor industry, and the news of his sudden death will come as a painful surprise to his very wide circle of friends.

Three weeks ago a severe cold, from which Mr. Staner was suffering, developed into pneumonia, and the position rapidly became critical. The crisis, however, was safely passed, but on Sunday last complications became evident, and just after midnight he passed away.

No one knew Mr. Staner better than his own colleagues, who, apart from absolute confidence in his sound judgment, never found him too busy to discuss and assist in matters even most remotely concerned with business. In all one's dealings with him one was conscious of the most kindly and courteous consideration, for he possessed to an unusual degree the happy manner of conducting all business matters on the lines of friendly discussion.

Mr. Staner was a member of the R.A.C. Committee, and also an honorary member of the Institution of Automobile Engineers.

MILITARY NOTES.

The Best Platoon Leaders: Saving a Damaged Aeroplane.

PROMOTION.

WE are pleased to learn that Capt. B. C. Barton, formerly a member of the committee of the Public chools M.C.C., and now serving in the I.T., A.S.C., has been promoted to the nk of Major.

D.C.M. FOR BRAVERY WITH THE TANKS.

CPL. D. C. JENKINS, Tanks Corps, North Kensington, has won the D.C.M. When his officer was illed he kept his Tank in action with kill and gallantry until it was buried. Ie then took out all his crew and guns nd, placing some on the top of the ank and some on the ground, opened re on the enemy and prevented them rom advancing.

ROM ONE TANK TO ANOTHER.

WHEN casualties occurred in his Tank under very heavy shell and machine gun fire, L.-Cpl. E. agger, Tank Corps, Levenshulme, transferred a wounded member of his crew o another Tank. He also gained the .C.M. for his heroism.

SAVING A DAMAGED AEROPLANE.

TO save an aeroplane which fell between our lines and those of the enemy, Lt. Cuthbert D. Fellowes, R.F.C. and Yeomanry, who was awarded he Military Cross, twice crawled over hree hundred yards of open ground in ull view of the enemy, started up the ngine, and, lying flat on the ground, llowed the machine to pass over him. He then ran after it and gained the ilot's seat. The machine left the round, and, although the controls had een shot away, he shut off the engines nd steered it out of the range of the nemy's guns.

AIRMAN'S FINE FEAT.

SEC.-LT. ROBERT N. HALL, R.F.A. and R.F.C., attacked three enemy pilots, bringing two down in flames and leaving the third on fire. To accomplish this, he crossed the lines at a height of twenty feet, his machine being severely damaged by machine gun fire. He was awarded the Military Cross.

THE BEST PLATOON LEADERS.

MAJ. DAVID DAVIES asked in the House recently whether, owing to the large number of candidates sent home from Overseas for admission to officer cadet units, candidates from home sources are not accepted, save in special cases.

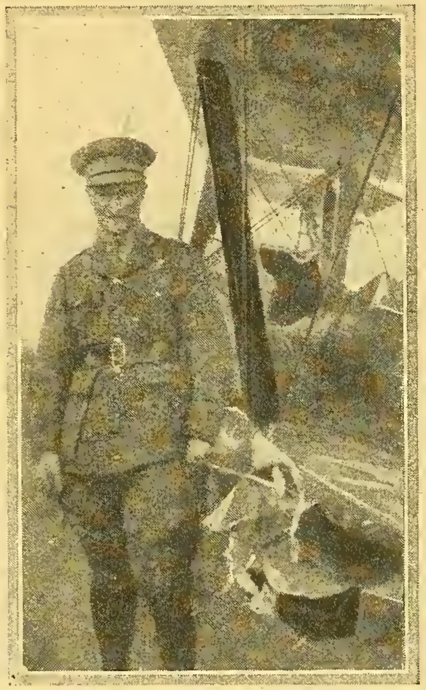
Mr. Macpherson's answer was: Preference is naturally given to candidates who are recommended while serving in the face of the enemy. Recently the course of training in cadet units has been lengthened; consequently it has been found necessary to cut down the numbers accepted. It is felt that candidates who have shown the qualities of leadership in the field will be readily selected for corporal's rank, and these are the men to train for the position of platoon leader. We have found that, as the war proceeds, we are able to raise our standard owing to the experience gained as non-commissioned officers by candidates for commissions.

A PILOT MOTOR CYCLIST.

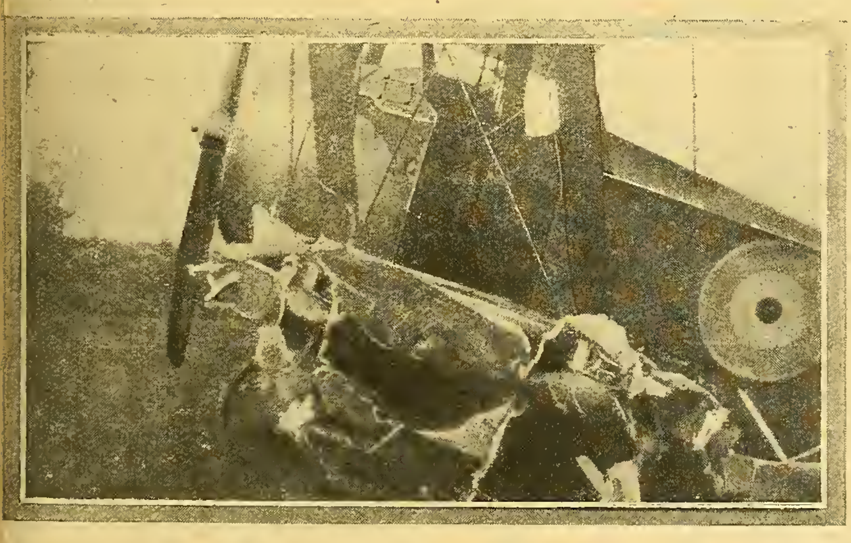
WE recently had a letter from F. M. C. Houghton, who was the originator of the successful naval and military race meetings held at Brooklands in 1915. In those days Houghton was in the Cyclist Corps, but later on became attached to the R.F.C., and after serving as an observer succeeded in getting his wings, which he did in the excellent time of two months.

Writing to us, he says: "Do you know, I had a collision in the air? It occurred at the end of October, while having a practice scrap with another pilot. He did not pull out of his dive quickly enough (he was on my tail), and would have crashed into me more than he did, only I happened to see him coming and did my best to avoid him. I partially succeeded, but, all the same, he had the bad taste to remove my lower port aileron wing tip with his air screw. I went down in a violent hurry, but managed after a bit to slow her down as gently as I could, suffering much apprehension as to whether and when my left wing would fall off and finish my career. Meanwhile, the other fellow glided off home unhurt. Luckily, I saw him, but he did not see me, and thought me a 'gonner,' as he believed he had hit me full amidships. I made a perfect landing, found a bicycle, and beetled off home. They all thought me a corpse. Tut!"

Referring to his last crossing Overseas, he writes: "We came over the night of that gale, and we knew all about it, too! There was a nasty wind from the starboard, which made us fly 'left wing low' all the way. The waves were so high that several times they came right over the upper deck; then I was pleased with my leather coat. Sometimes it seemed as if we should never gain an upright keel, and I had a colossal wind up. People were sliding right down to the rails, and there were some poor little W.A.A.C.'s on board, for whom I was jolly sorry."



After a collision in the air. The pilot is Lt. F. M. C. Houghton, who organised the successful Naval and Military motor cycle race meetings at Brooklands in 1915.



A near view of Lt. F. M. C. Houghton's damaged aeroplane.

CURRENT CHAT

SPECIAL FEATURES

ROTARY & RADIAL ENGINES FOR MOTOR CYCLES. A SYMMETRICAL CYLINDER
FIRST 1,000 MILES ON A MILITARY MODEL A.J.S

TIME TO LIGHT LAMPS

GREENWICH TIME.

Feb.	7th	5.27 p.m.
,,	9th	5.30 ,,
,,	11th	5.34 ,,
,,	13th	5.38 ,,

Compulsory Digging.

There will be Association football and compulsory potato digging at Eton this half, says the *Eton College Chronicle*.

English Machines for Portuguese Army.

The Russian collapse has released many motor cycles for the civil market, but not all those built to the Russian specification. Royal Ruby machines of this type, however, are now being used by the Portuguese troops in France.

Occupations for Discharged Soldiers.

Discharged soldiers engaged in any one of the following occupations will be regarded as undertaking work of national importance: Shipbuilding, ship repairing, marine engineering, munitions, agriculture, agricultural implement making, food production, railways, tramways, iron ore mines, gas, water, electric undertakings; other work granted priority by the National Labour Priority Committee.

Home Production of Fuel Oil to be Increased.

In the production of fuel oil from home resources recently, the existing plants at the shale works in Scotland and the gasworks and coke ovens throughout the country are being pressed to their full capacity and are being extended. Retorts are to be used at the gasworks rather than the collieries, because labour, machinery, and experience are available at the gasworks.

Mails Lost at Sea.

The Postmaster General announces the loss, through enemy action, of mails despatched on January 24th for Salonica, Egypt, the Mediterranean, and British troops in Italy, containing letters, etc., for the Italian Expeditionary Force, Salonica Force, Corfu, Malta hospitals, and the Egyptian Expeditionary Force, which reached the Army Post Office, London, for despatch between midnight, January 21st, and midnight, January 23rd; letters, etc., for the Greek Post Office, Salonica, Malta Civil Post Office, the fleet at Malta and in the Eastern Mediterranean, and the Egyptian Civil Post Office, which reached the General Post Office, London, between 10 a.m., January 22nd, and 10 a.m., January 24th; also parcels for the hospitals and fleet at Malta and the fleet in the Eastern Mediterranean which were received in London between January 21st and 24th.

Coal Gas Equipment.

One Manchester firm which has laid itself out on a large scale for the equipment of coal gas containers finds itself with £1,000 value of bags on its hands as a result of the latest Order.

Second-hand Trade.

Strange to say, most of the large dealers in Birmingham and Manchester are fairly satisfied with present business, things being better than "one would expect."

Transport Board's Task—Eliminate Waste.

Mr. F. G. Bristow, secretary of the Commercial Motor Users' Association, says: "My association has offered its services to the new Transport Control Board. We have fifteen years' experience. No doubt the Board will first co-ordinate the road transport system and eliminate wastage."

To Protect the Interests of Motorists.

A meeting of members of the press and those interested in the motoring movement was held at Frascatti's restaurant on Friday afternoon last at the invitation of Mr. Arthur Goodwin, of Messrs. C. A. Vandervell and Co., in order to secure justice for all motorists, whether motor cyclists, light car owners, or owners of industrial vehicles.

The views expressed by the various speakers indicated that joint organisation of and joint action between existing motoring organisations was essential. It is to be hoped that the views expressed will help to promote the United Council of Motoring Organisations, mention of which has been made on previous occasions.

Coal Gas in Manchester.

A member of our staff says he recent
saw more motors in one day in Ma
chester than in a whole week in Covent
and Birmingham together, and two o
of three had gasbags on top.

Economy in Use of Motor Vans.

Applications for permits for new mot
vehicles to take the place of existi
vehicles cannot be granted unless it c
be proved that the use of a motor vehic
is absolutely essential in the nation
interest, and it is not possible to obta
a second-hand substitute.

Uniform in Mercantile Marine.

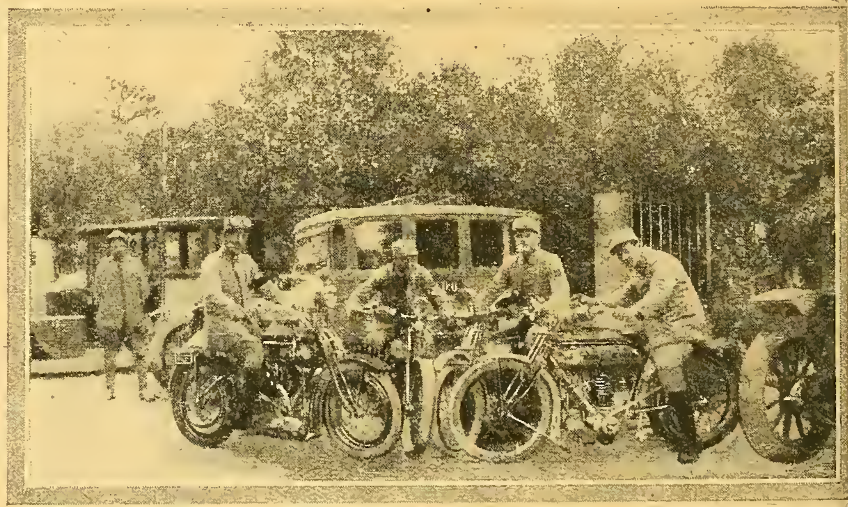
Agreement has at last been reached
the question of a standard uniform f
the mercantile marine service. An attra
tive cap badge for the standards h
been designed, consisting of a crown an
certain emblems expressive of the se
surrounded by oak leaves.

Prosecuted for using Gas.

George Weston, chauffeur, and Joh
Thomas Duncan, of Cardiff, who we
charged with using gas for the drivin
of a motor car to a meet of the Lla
gibby Hounds, were at Cwmbran (Ne
port) Sessions recently ordered to pa
the former £2 and the latter £10. Th
was the first prosecution of the kind.

An Extraordinary Flying Story.

We can vouch for the truth of th
following aeroplane story, incredib
though it sounds: An air mechanic wa
swinging a prop when the engine bac
fired and struck the back of his head-
the result was a broken prop and a ma
laid up for twenty minutes only, wit
not even a broken skin!



D.R.'s of the French Army mounted on Triumph and B.S.A. motor cycles. At the rear are cars belonging to the staff.

Footballs for Overseas.

The Director General of Voluntary Organisations has received from Mr. Barclay Walker generous gifts, including two hundred footballs, for distribution to the troops serving Overseas.

Petrol Supply and Storage.

The possession by a motor cyclist of motor spirit (said Sir A. Stanley) obtained under the authority of a motor spirit licence does not render him liable to penalties for hoarding, provided he complies with the provisions of the Petroleum Acts regarding storage.

Car Gas from House Main.

Major Huth, Second in Command of the Military Detention Barracks, Farnborough, was fined £9 and £3 3s. costs for disconnecting a pipe outside the gasmeter of his house and filling the gasbag of his motor car without allowing the gas to pass through the meter.

Motoring to Weddings.

Although the use of motors by wedding parties is definitely declared by the latest Order to be illegal, a case of this nature has been dismissed by an Irish magistrate. His argument was that at the present time nothing was more important than weddings and christenings, and that, con-uently, the wedding would be regarded a necessary household affair and the e dismissed.

e Annual General Meeting of the Motor Cycling Club.

The year 1917 was an uneventful one or the Motor Cycling Club. Owing to the continuance of the war the club was forced to remain inactive, and as the members have been exempted from paying their annual subscription the revenue has been dependent upon interest on War Loan. As may be imagined, the attendance at the annual general meeting was not large, only about a dozen members putting in an appearance. Among them were Vivian Olsson, formerly in the R.N.A.S., but invalided out owing to rheumatism, after a long spell Overseas; B. A. Hill, Sec.-Lt., R.F.C., who was the proud wearer of the Mons ribbon; Harold Karslake, a warrant officer in the same corps; and E. Bridgman, an inspector in the Special Constabulary (H.Q.C.D.)

The proceedings of the meeting were purely formal. On the proposal of Mr. R. H. Head, chairman of the committee, Mr. E. M. P. Boileau *(The Motor Cycle)* was elected to take the chair at the meeting. The first item on the agenda was the reading of the notice concerning the meeting at "The Monico," Piccadilly, London, W.1, at 6.30 p.m. on Wednesday, January 30th. The minutes of the last annual general meeting were then read and confirmed, and next the report and accounts were duly received and adopted. The only matter in the report, on which a question was raised by Mr. B. Marians, was the reference to the fact that a considerable number of unclaimed awards remained in the hands of the club.

The next procedure was to elect officers, the committee, and an auditor for 1918. Those who served during the past year were duly re-elected, and are the following: President, Maj. Charles Jarrott, O.B.E., R.F.C.; committee, Messrs. R. H. Head (chairman), A. Candler, A. C. Armstrong, E. Gwynne, P. G. E. James, H. G. Bell, H. Karslake, B. Marians, R. B. Clark, C. J. Seed, E. Bridgman, and H. F. Edwards; captain, Mr. W. H. Wells; secretary *(pro tem.)*, Mr. A. Millbourn; and auditor, Mr. W. Richards.

The meeting terminated with a vote of thanks to the chairman.

Unclaimed Medals.

Numerous unclaimed gold and silver medals and other awards are in the possession of the Motor Cycling Club. All who have not received the awards they earned in 1914 are requested to communicate with the secretary, Mr. Arthur Millbourn, 19, Baker Street, London, W.1. All clubs and individuals who are holders of perpetual cups or trophies are asked to return them as soon as possible to Mr. Millbourn.

It appears that all members have been asked to claim their awards, but in many cases no replies have been received. It is obvious that the Club cannot undertake to post them to those members who have won them, as so many addresses must necessarily have changed in the period which has elapsed.

Accumulator Supply for Electric Lamps.

A motor cyclist in the Letchworth district was recently summoned for riding without a light. According to the *Letchworth Citizen*, it was stated on behalf of the defendants that "the water in the accumulator was frozen, and that the defendant could not get the required amount of gas for the acetylene lamps." A correspondent—"Kuklos"—writes to us: "I wonder if there was enough carbide in the magneto to make the plugs spark."

Wholesale Motoring Restrictions.

The following paragraphs from *The Autocar* of January 26th give some idea of the restrictions on motoring now existing in all parts of Europe. This information may make even those agitators against English restrictions pause to think a trifle:

IN FRANCE.

"Under the new system of taxation in France a tax of 10% is imposed on purchase of luxuries, including motor vehicles, so that a £500 car will cost £550."

IN SPAIN.

"Owing to the serious petrol shortage in Spain the Government has ordered all gas and coke-making establishments in the country immediately to take every possible step to increase the output of benzole."

IN NORWAY.

"In Norway the use of private cars is forbidden, only vehicles on work of a national or public character being allowed."

IN GERMANY.

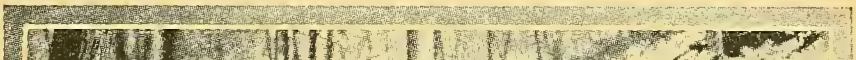
"The Germans are using alcohol obtained by distillation of the residual liquors of cellulose factories as motor spirit."

IN THE NEW DEMOCRACY.

"Petrograd has imposed a new tax on motor cars of 150 roubles (about £15) per horse-power."

IN HOLLAND.

"For six months no petrol has been imported into Holland from America. The scarcity began when a tanker with 2,000,000 gallons was torpedoed off Ymuiden, and since then all petrol has gone to the military authorities.

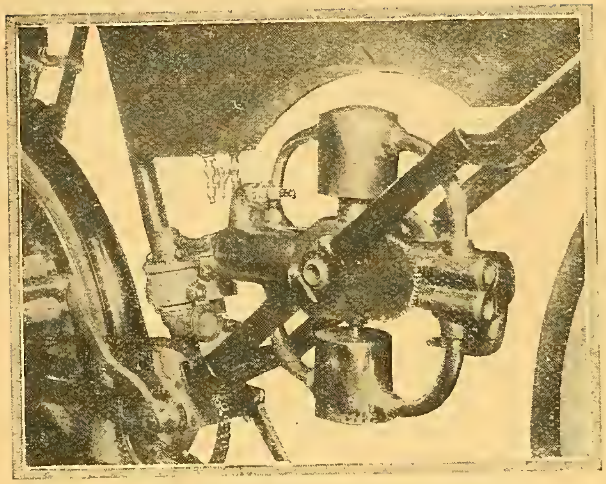


An Indian sidecar used by a sportsman in America to carry his "bag," which in this instance consists of a fine buck. The animal was brought down about ten miles from the Springfield factory where the Indian motor cycles are made. In these famine days many British motor cyclists would like to be using their outfits for a similar purpose.

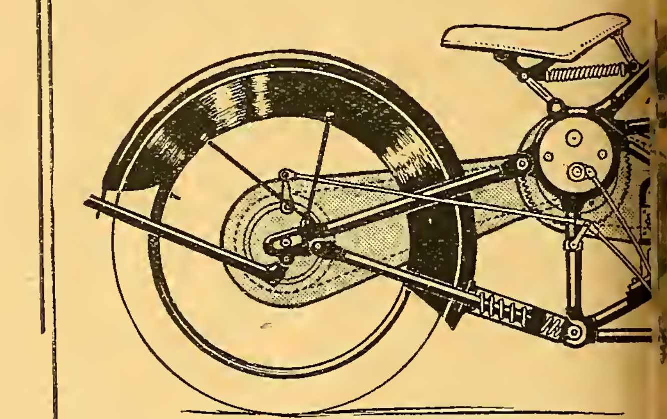
("*Motor Cycle and Bicycle Illustrated*," *New York*.)

ROTARY & RA

A RÉSUMÉ OF PAST AND PRESENT EFFORT AT
AND DESIGNING THIS TYPE OF ENGINE FOR MOTOR



The Barry two-cylinder opposed rotary engine adapted to a motor cycle in 1904. The silencers are balanced and opposed, rotating with the engine. The cylinders are offset, the crank being double throw, set at 180°, thus giving even firing.

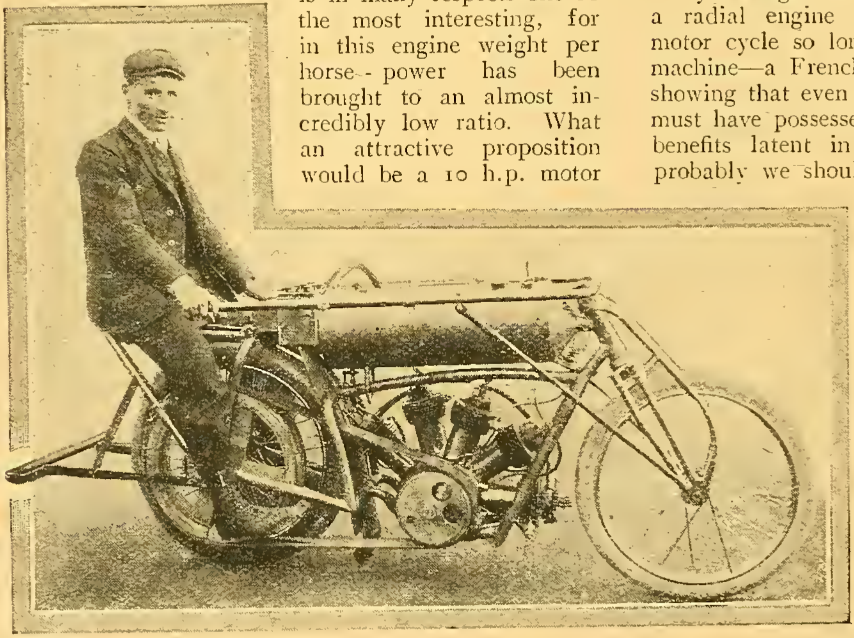


The unconventionally designed machine described in the acc
is the fitting of the rotary engine, the carburetter of which is
rear springing arrangement will doubtless cause some criticism a
consideration of our readers. The sketch was sent by M. Henr

THERE is at the present time a great deal of talk on the question of adapting rotary and radial engines to motor cycles. The remarkable developments that have taken place in rotary, and, indeed, in all types of engines used in aeroplanes, have produced in the minds of motor cycle engineers new ideas and aspirations—ideas, too, that may be termed revolutionary when the rather stereotyped designs of motor cycle engines in general use are borne in mind. That the war has given a great impetus to the designing of light but powerful engines for motor cycles there is no doubt, and without question after the war the great progress made in aero engine manufacture will be reflected on the motor cycle industry.

Of the numerous types of aero engines, the radial is in many respects one of the most interesting, for in this engine weight per horse-power has been brought to an almost incredibly low ratio. What an attractive proposition would be a 10 h.p. motor cycle weighing about the same as a T.T. model. Yet, in spite of the scoffers, this may come about, and the use of a radial or rotary engine may enable it to be done. Of course, there are numerous points that would have to be carefully considered before these types could be rendered suitable for motor cycles, but the experiments that are taking place go to show that many clever engineers see a great future for them. It is interesting to look back and to find that *The Motor Cycle* was alive to the possibilities in this type of engine over ten years ago, and it is certainly remarkable that a radial engine should have been built into a motor cycle so long ago as twenty years. This machine—a French production—ran successfully, showing that even at that early date the designer must have possessed remarkable insight as to the benefits latent in this particular design. And probably we should not be far wrong in stating that this was the first radial with more than three cylinders to be successfully made. Now, two decades afterwards, we see radials and rotaries developed to an extent not dreamed of even seven years ago, and taking a place in aeroplane work which no other engine is likely to usurp.

Then there was the Barry of 1904—a rotary engine shown at the Stanley Show. Few were the motor cycling enthusiasts who refrained from sarcastic remarks on first beholding this engine of revolutionary design—a type many years before its time.



A 20 h.p. five-cylinder Esnault-Pelterie fitted to a racing motor cycle in 1908, and at the time the lightest engine for its power yet constructed for a motor cycle.

An
system
Boursiac
engine i
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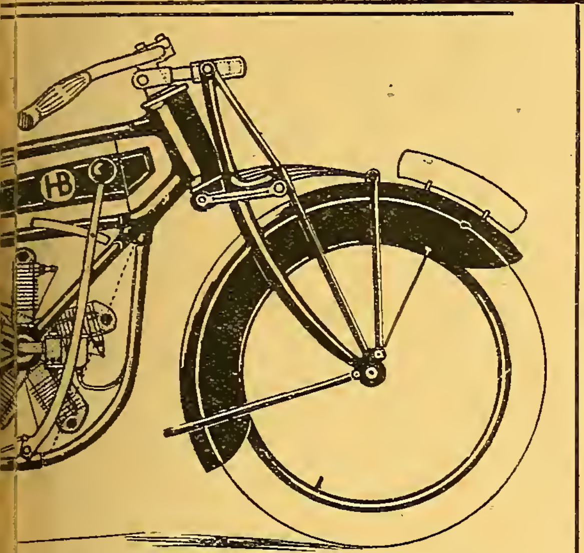
charge t

AL ENGINES.

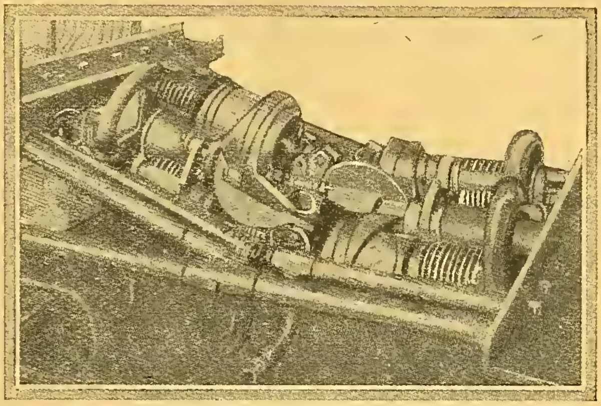


The system of frame springing is as worthy of note as projecting forward from the centre. The working of the as to how it works, and we commend the problem to the lench reader.

They failed entirely to appreciate the object the designer had in view, *i.e.*, the production of an engine giving considerable power with little weight, and also smooth running. The machine was extremely nice to drive, very flexible, free from vibration, and not prone to overheat—attributes which one thinks would surely have led designers to further experiments in that field.

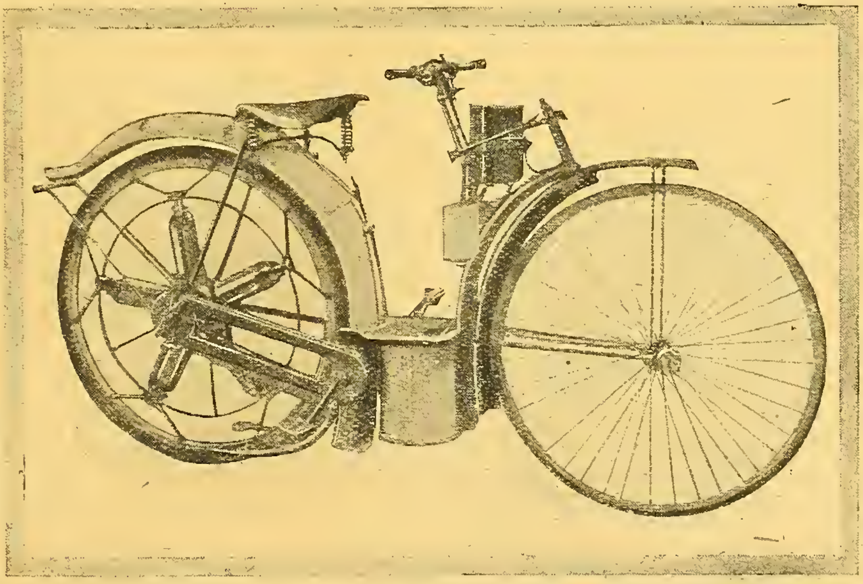
In spite of the unquestionable success of radial and rotary engines on aeroplanes, it does not follow that this type will be easily adapted to motor cycles. There are many features about it which, at present, would be very objectionable in a motor cycle, but which matter very little to an airman. Comparatively speaking, the life of a rotary engine is short and consumption of oil and petrol great. These drawbacks, however, may be gradually overcome when the proposition of fitting them into motor cycles is tackled seriously. It must be remembered also that an aero engine is required to run continuously at practically full power, and cannot fairly be compared with the motor cycle engine, which is rarely called upon to develop its maximum output.

Other types of radial and rotary engines which we have from time to time described are reproduced once more.



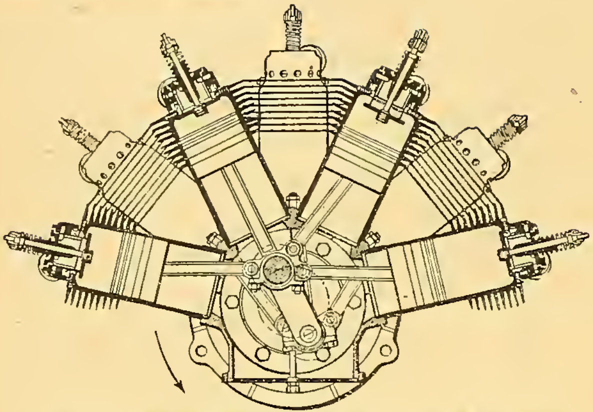
The A.R. two-stroke rotary engine. An unconventional design described in December, 1913, consisting of two pairs of cylinders mounted on independent shafts connected by a universal joint. The lower portion of the cylinders acted as the compression chambers. After the gas was compressed in one cylinder it descended through the transfer ports to the combustion chamber of the cylinder beneath it.

The Anzani engine, which was probably the earliest practicable radial purposely designed for aeroplane work, is shown. The fan-shaped engine was the first manufactured, and some time afterwards the Y pattern was evolved. Some of the radial and rotary engines shown are ingenious in design if rather impracticable. The A.R. two-stroke, for instance, shows great originality, and in it there is the nucleus for an engine of startling design. This brief review of former efforts shows, however, that many designers have in the past realised the possibilities of this type of engine, although their endeavours at the time were not directed to the obtaining of great power in proportion to the weight of the engine, as would be the chief aim to-day.

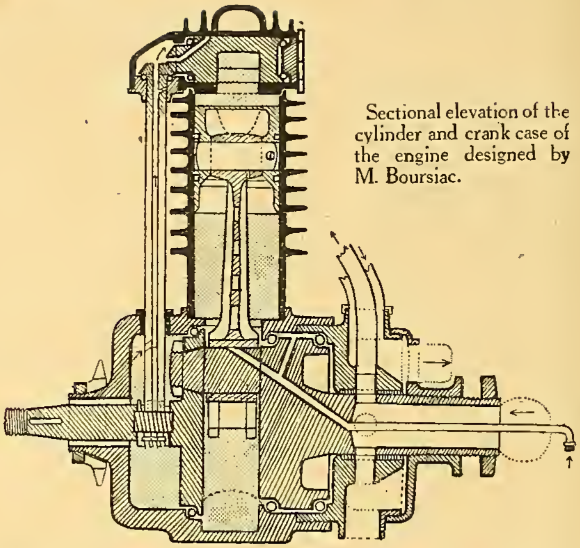


A rotary engined motor cycle, built in France in 1896, and probably the first rotary ever built. It will be observed that the engine has five cylinders and is located in the rear wheel. The general design of the machine is extraordinary, but it would be a relic worth possessing.

Rotary and Radial Engines.—



The 30 h.p. Esnault-Pelterie engine, described in full in January, 1908. The seven cylinders are divided into two groups, one of four and the other of three cylinders, and assembled on one crank chamber. Each group has a separate carburetter, all the combined inlet and exhaust valves being operated by one cam wheel.

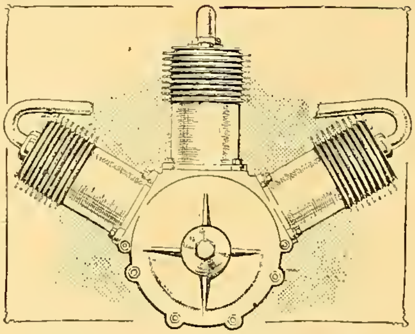


Sectional elevation of the cylinder and crank case of the engine designed by M. Boursiac.

The latest motor cycle design, both of a rotary engine and of a special frame to hold it, has come quite recently from M. Boursiac, a French rider.

A French Rider's Idea.

It will be observed that the three members supporting the engine are of duplex construction, so that the stresses are equally distributed both laterally and vertically, thus making the crankshaft the centre of a perfectly triangulated structure. The transmission from the engine to the rear wheel is through a countershaft gear box, which is placed immediately underneath the saddle, the drive from the engine to the countershaft and from the countershaft to the back wheel being by chains. The clutch lever will be seen on the right of the tank, and is of the Indian type. The change speed gear lever is invisible in the drawing, and the type of gear box is not made clear by the designer i his letter to us.



Sectional view of the fan type three-cylinder engine, the earliest type produced by Anzani. In 1914 Messrs. Anzani were producing twenty-cylinder rotary engines of 200 h.p.

The springing of the frame i particular interest, and it wil noticed that the front spring f are very much on the lines descr in the Sunbeam patent in T *Motor Cycle* of November 22nd, but there is no suspicion or possibility that the French idea is in any way a copy; also, the handle-bar is adjustable for height on lines similar to that

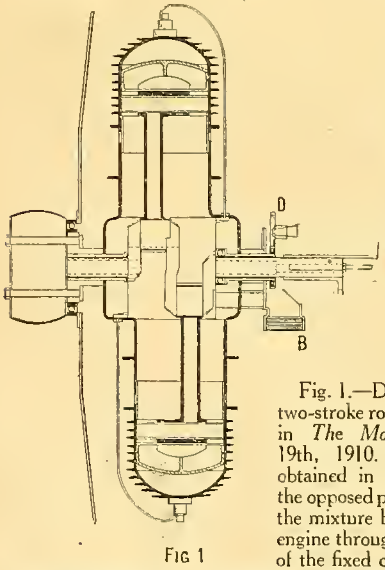


FIG 1

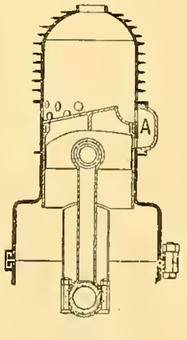
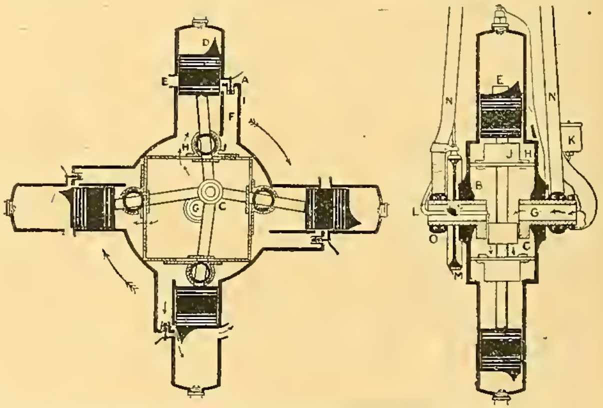


FIG 2

Fig. 1.—Diagram of the Farcot two-stroke rotary engine described in *The Motor Cycle* of May 19th, 1910. Compression was obtained in the crank case when the opposed pistons came together, the mixture being drawn into the engine through the hollow portion of the fixed crankshaft. A shows fixed distributer, B attachment for carburetter. Fig. 2 shows cylinder, piston, and crank case of the engine.



A four-cylinder two-stroke rotary engine designed by E. Dobson, and published by us in November, 1911. The sketch shows the engine with slide valves operated by the connecting rods. The advantage claimed for this was that it would dispense with crank case compression, and measure the correct quantity of gas for displacement of the exhaust.

A. Air scavenging valve
B. Bushes
C. Cranks
D. Deflectors
E. Exhaust
F. Transfer passage
G. Gas inlet
H. Slide valve worked by connecting rod
I. Inlet
J. Roller and socket joint with packed roller
K. Carburetter
L. Lubricating pipe
M. Band brake
N. Fork tubes
O. Ball bearings, enabling crankshaft to rotate when brake is released

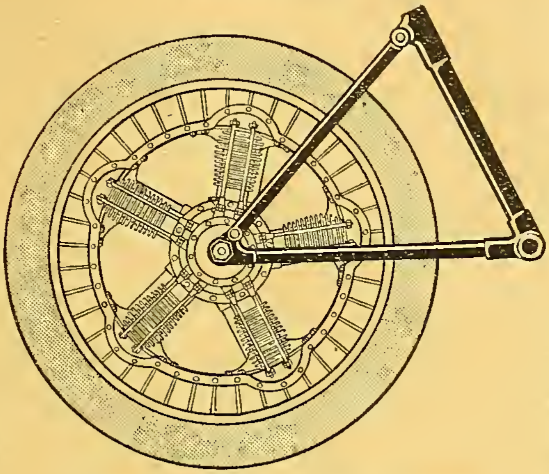
Rotary and Radial Engines.— described in *The Motor Cycle* of December 13th.

The springing of the rear portion of the frame may be clearly seen in the drawing to consist of a hollow rear lower tube (or chain stay) in the front portion of which is a spring working in compression and resisting road impacts against a sliding piston to which the end of the tube pivoted at the wheel is attached.

The Engine.

As regards the engine itself, the designer has kindly sent us two detailed illustrations. It will be seen that the engine is of the rotary type with hollow crankshaft, and that the inlet is introduced through the hollow crankshaft, and is exhaust-jacketed, so that the incoming gases are adequately heated before reaching the cylinders. The bore and stroke suggested for this engine are 40 × 50 mm. The intention is to employ rotary valves.

Other points of interest in this extremely ingenious machine are the provision of adjustable footrests, as well as adjustable handle-bars, grip control — after American practice — the fitting of 28in. × $2\frac{1}{2}$in. tyres, enclosed chains, and internal expanding brake.

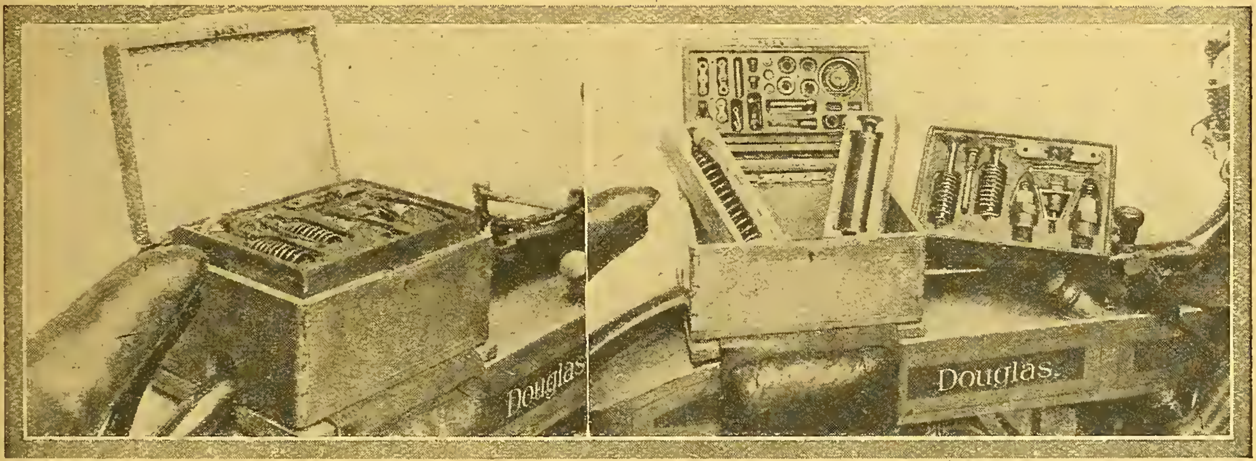


A Belgian design for a five-cylinder rotary engine submitted to us in March, 1916.

HOW TO CARRY SPARES.

A Device which in the Long Run will Save Time and Temper.

THE problem of carrying spare parts has often puzzled riders of motor bicycles. Many carry their odds and ends loosely in the toolbag, or merely wrap them round with rag, with the result that the parts often get damaged, or are carried in a more or less confused mass. Some people wire nuts and split pins together. This again is not a wholly satisfactory method, while anyone who has attempted to carry small parts, such as bolts, nuts, and split pins, more or less loosely in a tin box, knows that eventually the corners of the nuts become rounded and worn, and the parts ultimately suffer damage through the chafing caused by vibration.



An admirably contrived spare part carrying case fitted to a Douglas. The owner is to be congratulated on devising so convenient an arrangement Only too often are spare parts and tools rolled up in a jumble of dirty rags and carried loosely in the tool case.

The rider of the $2\frac{3}{4}$ h.p. Douglas whose system of carrying parts we illustrate has tackled the problem in a sensible manner. It will be noted that a well-made dovetailed wooden box is carried on the top tube, and in it each individual part has its own receptacle carved for it. The top tray carries two spare valves, a spare tappet, a belt fastener, a belt punch, and two spare plugs, each neatly recessed into its own partition so that damage is quite impossible. The second tray holds spare chain links, each link having a separate compartment, and the same remarks apply to bolts, washers, and even split pins. It will also be noticed that special carriers have been carved to take the grease gun and spare fork spring.

Such care meets with its own reward, as, when the rider desires to replace anything on the road, he may be sure that it can be quickly found, will be absolutely undamaged, and consequently quite ready for use.

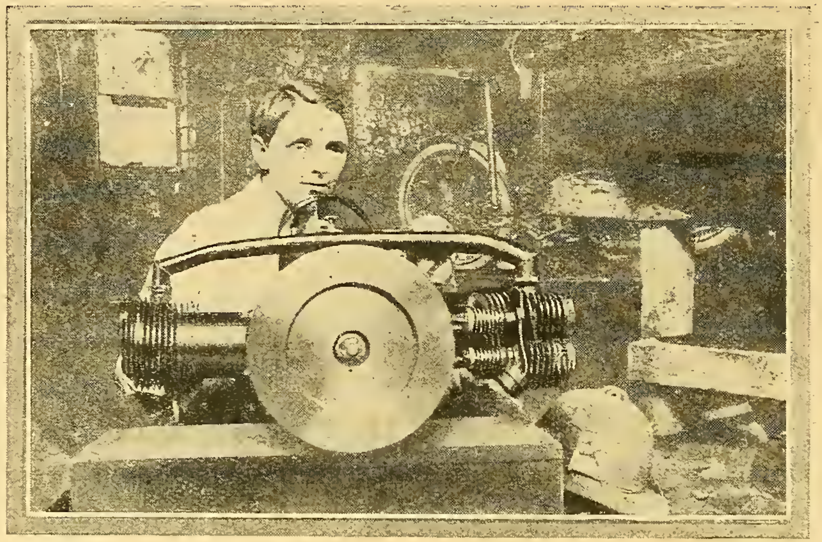
GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

A FLAT TWIN WITH TRIUMPH CYLINDERS.

Building up a Flat Twin Engine from Old Triumph Parts and other Discarded Scrap from the Machine Shops at Dar-es-Salaam, East Africa.

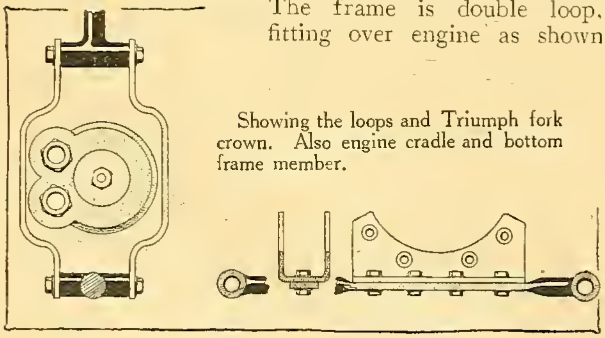


Sgt. Douglas Mail with the engine he built up in one of the Dar-es-Salaam machine shops.

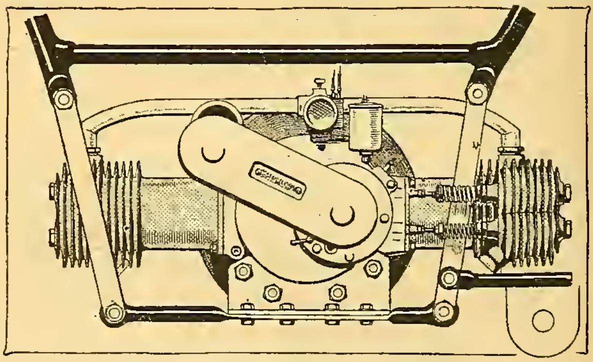
FROM Dar-es-Salaam, East Africa, Douglas Mail (Sgt.-Mechanic) sends the following interesting letter, together with a batch of photographs, reproduced on page 122, and also a description of a novel flat twin engine which he has with much skill and ingenuity built up from oddments. Although crudely finished, it strikes us as being good work, considering the limited means that were at his disposal, and it proves how keen and unabated is the interest in motor cycles, even in this outlandish place on the East Coast of Africa:

"I am sending with this description a set of photographs of various points of interest taken during the campaign. Though all are not actually connected with motor cycling, they may prove of interest.

"I have been experimenting with a big flat twin, which I have built of scrap Triumph parts, and send a photograph of this with myself in the background. At present I have it on test, and have obtained excellent results. Roughly the features are: Built-up three-piece crankshaft, with three bearings, two ball and one phosphor, in timing case cover. Of course, the engine is crude in some respects, owing to the conditions under which it was built. The cylinders being alike, two sets of valve gear were necessary, one on either side. A new set of cams I made for the near side, owing to their rotating in the reverse direction. One half-time wheel is a fixture on shaft, being brazed on, the main shaft bearing recess being skimmed out to allow it to pass through. The frame is double loop, fitting over engine as shown in the sketch. Note that the gear box shaft is longer than usual, to allow for chain alignment. The engine throttles down well, gives very slow running, and has exceptionally rapid acceleration. As an experiment it is, I think, rather unique. I am not aware of another one being built on the field. And it would be interesting to learn if any other engine has been built from what was practically improvised material. All the boys here were anxious to see how my experiment panned out. I think of making several improvements, the results of which are likely to be even better than those obtained up to the present.



Showing the loops and Triumph fork crown. Also engine cradle and bottom frame member.



The 8 h.p. flat twin built up from two Triumph cylinders and other oddments.

The range of experiments I have the intention to make, if they can possibly be carried out, will be in my next letter. But unfortunately we never know when or how suddenly we may be removed."

According to a preliminary estimate by the Geological Survey, the amount of petroleum produced and marketed in the United States last year reached the record-breaking total of 341,800,000 barrels. The quantity exceeded by 14% the record output of 1916. The enormous demand absorbed not only the current output, but necessitated a draft of about 21,000,000 barrels of the oil in stock, principally in California and Illinois. The surface reserve of crude oil at the end of the year is estimated at 153,000,000 barrels.

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

FUEL LOSS AT CARBURETTER.

Sir,—Surely your contributor "Engro," in January 24th issue, is wrong in his calculation of gas velocity on suction stroke. 1,200 r.p.m. = 20 r.p.s.—the suction stroke, therefore, which is, roughly, half a revolution, is completed in one-fortieth of a second, in which time twenty cubic inches are inducted. $\frac{20\times40}{.7854} = 1{,}018$ inches per second velocity—a comparatively low speed, yet four times his figure.

J. W. G. BROOKER.

POST-WAR DESIGN.

Sir,—I have followed very closely the correspondence on post-war designs in *The Motor Cycle.* In your publication of September 27th, 1917, which I have just received —rather late, but still most acceptable—my interest was aroused by the suggestion of Wallace R. Warne *re* the Knight engine for motor cycles.

As anyone who has had practical experience with cars will know, the Knight engine has all the qualities "W.R.W." describes, and I think they should be very successful on motor cycles. But why use a double-sleeve valve engine when a single-sleeve Argyll engine is so successful? This engine having only one sleeve has less friction, and therefore generates less heat. It should also be very much lighter with the absence of one sleeve and two eccentric shafts. To replace the shafts it has a worm-driven eccentric pin. Excepting the design of the piston it has all the other qualities stated. I quite agree with "W.R.W." on all his other points, and I should very much like to own a perfectly silent model. Good luck to the "Blue 'Un."

M.E.F. ARREMMA.

TECHNICAL INACCURACY.

Sir,—I have been closely following the absurd letters (on both sides) on "Technical Inaccuracy." It really seems impossible that people can be so childish as to "squabble" over a story which was obviously intended to be humorous, and the only explanation I can think of is a longing to see their names in print! Had "A Race with Ruin" been put into *Punch* these *precise* readers would have laughed at it. May I refer to a story in *Punch's* Almanack for 1918, entitled "George's V.C."? Why did no Army people write against the many absurd jokes in that? For instance, does a colonel postpone an important interview because a sergeant-major would like to speak to him? No; of course not; but it was just a joke, a good humorous story, and everyone knew it. So here, "A Race with Ruin" is a humorous story, and not intended to be correct in details; that is half the fun of the story!

With regard to the letters of Chas. S. Ives, F. Jones, and "R.O.W.," surely the writers have more decency than to "stick up for" the murderers of Nurse Cavell and Capt. Fryatt, the sinkers of the *Lusitania,* and the instigators and executors of hundreds of other crimes. I entirely agree with Sec.-Lt. Addenbrooke that if you begin to run short of readers some of us will have to take several copies per week.

Glasgow. A.R.C.H.

PISTON DESIGN IN TWO-STROKES.

Sir,—I received *The Motor Cycle* of January 17th, and note Mr. Martin's reply to my letter.

I quite agree with his statement that a small amount of vacuum is caused in the cylinder owing to the inertia of the exhaust gases passing out of the exhaust port: otherwise, with the comparatively low crank case compression employed on most two-stroke engines, it would be impossible to transfer a sufficient volume of gas, *via* the transfer port, to obtain efficient running.

I still maintain that, with the rings situated at the bottom of the piston (as shown in Mr. Martin's fig. 4), a certain amount of compression would be lost before the piston reached a point in the compression stroke where the rings shut off the part of the cylinder above the piston from the ports.

It would be an interesting experiment to fit a standard two-stroke engine with a piston of Mr. Martin's design and of the same weight as the original standard piston and note the results obtained with each type in the same engine.

D. J. McDOUGALL.

AMERICAN AND BRITISH MACHINES.

Sir,—In your issue of January 24th I notice that "Chinook," speaking of the twist grip control system, says, "In traffic, for instance . . one's natural impulse on seeing an opening is to give the twist grip half a turn, thus banging the throttle open," etc.; but, as a constant user of this type of control before the war, I am quite unable to perceive any reason for this statement. Further on he also says, "The twist grip throttle control has three positions in ordinary use—pilot, half throttle, and full throttle—no other stages being recognised by the rider," but surely this is open to discussion.

Personally, I find that the great advantage of the American system is that it permits one to retain a strong grip on the controls *at all times,* whereas with the lever controls it is necessary to release one or more fingers from time to time, which is quite a big disadvantage on very rough roads. In spite of this, I have nothing but praise for the Triumph, which is undoubtedly "the goods" for active service.

I should like to add that I have enjoyed many articles by "Chinook," and am a constant reader of the "Blue 'Un," which reaches me every week. CANADIAN D.R.

B.E.F., France.

LUBRICATION IN INTERNAL COMBUSTION ENGINES.

Sir,—I notice in your issue of January 24th a statement is made in an article on lubrication that steam engine cylinders which have been running for years are to-day in as good condition as on the day of their erection, but that such reduction of wear is impossible with the internal combustion engine. Further sentences state that the bearings of the internal combustion engine have a comparatively short life.

These statements appear to me to be exaggerated. There are plenty of internal combustion engines which have worked steadily for ten to fifteen years or more and are still in perfectly good condition. I know one which was running perfectly after seventeen years' continuous work, during which the main bearings had never been adjusted, and the big ends only once. Such engines, in fact, are often scrapped when in perfectly good condition because the owner wisely prefers to get a more modern type of engine.

On the other hand, certain types of steam engines require pretty frequent adjustment, and some have the cylinders cast a good deal thicker than necessary for strength to allow for frequent reboring.

If the internal combustion engines used in motor vehicles do not wear as those I have mentioned it is simply because long wear is sacrificed to other considerations.

F. STRICKLAND.

WIRING AN ACCUMULATOR LIGHTING SET.

Sir,—"Chinook" unfortunately omitted to give the consumption of the small lamps, but if we assume them to be 0.5 ampère lamps, and connected in series, we get

$$\frac{4 \text{ volts}}{8 \text{ ohms} + 8 \text{ ohms}} = 0.25 \text{ ampère passing in the circuit,}$$

sufficient to heat the filaments to a red heat.

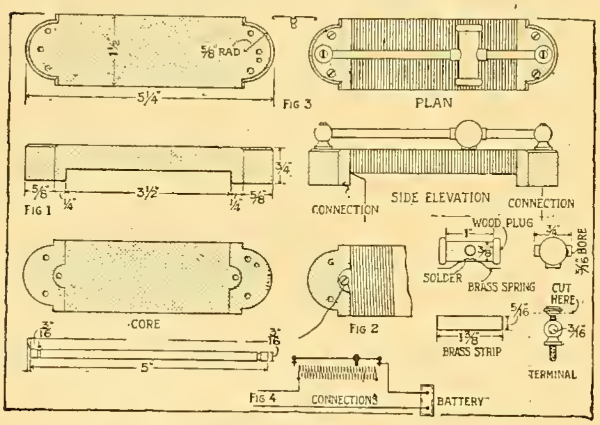
With the addition of the head lamp in series we get

$$\frac{4 \text{ volts}}{16 \text{ ohms} + 4 \text{ ohms}} = 0.2 \text{ amp. passing a current quite useless}$$

for the purpose required.

It will be seen from the above that three lamps made to consume 2 amps. altogether can hardly give any light with only 0.2 amp. passing. If "Chinook" is satisfied with the light in the side and tail lamps he can easily regulate the current in the head lamp by inserting a small sliding rheostat in series with the wire leading from the battery to the head lamp. Another plan would be to fit 4 volt 0.3 amp. lamps in the side and tail lamps connected in parallel with the rheostat inserted between the switch and the earth point.

With this plan all three lamps can be regulated simultaneously. With the lamps in parallel more current will be used (1.6 amp. against 1.25 amp.) when the lamps are burning at full pressure. A rheostat is an extremely useful instrument to have with any accumulator, as it not only protects the battery but increases the life of the lamps.



The cheap and simple electric rheostat here described.

The materials required are a piece of hard wood 5¼in. × 1½in. × ¾in., two ball-shaped terminals, a piece of brass rod 5in. × 3/16in., two pieces of brass tube 1in. × ⅜in. and ¾in. × 3/16in. bore, a piece of brass strip 1⅜in × 5/16in., seven yards Eureka wire No. 20 S.W.G., four 1in. screw nails, and two ⅜in. screw nails, the screws to have half-round heads. Take the wood core and cut to the shape shown in fig. 1. Place a footrule ⅞in. from one end, and mark off every 1/16in. for a distance of 3½in. Then take a T square and a sharp pencil and run lines across the top and down the sides. Then turn the core over and continue the lines on the under side in the way shown in fig. 2. A shallow groove must now be formed over the line previously marked. The groove should be sufficiently deep to hold the Eureka wire in position (about half the depth of the wire would do). The core can now be coated with shellac varnish and the ends blackened and polished. Fit the two small screws in the holes on the under side of the core, then take the Eureka wire and a short length of copper wire and twist the ends round one of the screws on the core, then proceed to wind the resistance wire tightly round the core, finishing at the screw at the opposite end.

The details of sliding spring, etc., are clearly shown on the drawings, and hardly require any description.

Fig. 3 shows a plan and side elevation of the rheostat completed, and fig. 4 the connections.

It will be seen at a glance that by moving the sliding spring a longer or shorter piece of resistance wire is inserted, thus controlling the strength of the current. The most convenient place for the rheostat is on the battery box in a horizontal position.

A. A. MORRISON.

GOODS MADE IN GERMANY!

Sir,—May I, as a constant reader and one who regularly looks for a copy of your excellent paper arriving from Blighty, express an opinion? When I first saw your advertisement *re* German goods my first impression was: Well, this is an all-British paper anyway.

On reading an expression of opinion by C. S. Ives it simply raised my contempt and passed from my mind. But now, on receiving the January 3rd edition, I find that opinion endorsed by others. It makes me disgusted to think there are (there cannot be many) Englishmen who formulate such ideas, and then put them in the category of sport.

One, "R.O.W.," mentions the Bosch magneto as the developer of the petrol motor. I contend it simply held back the advancement of British goods, inasmuch as it flooded the British market at a cheaper rate and worked. Hence the trusting British public found no reason to manufacture a like article. What about the British magnetos of to-day? Are not they efficient?- They could have been made years ago if needed.

We are fighting against our own money now, which was paid for those magnetos, among a colossal number of other things. But, there, one need not go into that part of it; it is *business* more than politics.

We have threshed it out in this ward (I am in hospital at present), and have come to the unanimous conclusion that such sentiments are tainted with Boloism and decidedly pro-German.

A NEW ZEALANDER.

France.

Sir,—An old adage says, "Even a worm will turn," but after reading the effusions of Mr. C. S. Ives, etc., in recent issues of "our" paper, one can only wonder *what would* cause these "worms" to turn.

One blushes to think that these white-livered gentry call themselves "Britishers," as no doubt they do. What *could* the "German beast" do more than he has done to make the world realise that "the only good German is a dead German"? The horrible crimes against humanity, civilisation, and common decency, that are a deliberate part of German policy, and are approved and applauded by the German people, do not stir the blood (?) of these "patriots" of the C. S. Ives type one iota!

They utter no protest against Hunnish devilry—no words, even, of sympathy with the victims, even when they are their own fellow-countrymen and women. Their sufferings at the hands of the loathsome Huns leave them unmoved. But at the least suggestion of just retaliation, even to the mild extent of refusing to shake the hand of the "blonde beast" (as they love to call themselves), still dripping with the blood of outraged, tortured, and murdered women and children, these "worms" writhe in agony!

The mere suggestion that we should refuse to take to our bosoms these enemies of the human race—these "vermin of civilisation"—still gloating over and glorying in their unspeakable crimes, gives Mr. Ives and his friends most exquisite pain! Can one wonder that as one contemplates these specimens of British (?) manhood one experiences a feeling of nausea? Pah! an ounce of civit, good apothecary!

You, sir, will have the approval and support of every Britisher worthy the name in the manly and patriotic attitude you have adopted in having "no truck," either now or in the future, with the "German beast."

GEO. P. WADDINGTON.

Sir,—When I first read your notice I greatly admired your idea, and was very much surprised at reading the letter of Mr. C. S. Ives. I was disgusted to think that anyone should ever write such pro-German rot, and yet have the cheek to want to dictate to you on what lines you were to conduct your paper, or to think that the withdrawal of his support would make you "put your shutters up." If some of your pro-German correspondents had stood under a Zepp. in an air raid, or been torpedoed and turned adrift on a raft hundreds of miles from land, without food, at night this winter, it might alter their views, and probably they would not be so keen of spending their money in Germany or yet have much love for the Huns.

I have been a motor cyclist for fifteen years, and a regular reader of your paper, and I was disgusted to think that there are supporters of Mr. Ives's views amongst your readers. To think that one of your correspondents should say, "Let us show we have no quarrel with the Germans."

What rot! What disrespect for the boys in blue and khaki who have kept the German devils from making our homes and families like they made the Belgians'. Have not these pro-Germans ever heard of Nurse Cavell, Captain Fryatt, the *Lusitania*, and thousands of other brutal outrages too numerous to mention? And then to find there are people living in England to-day childish enough to withdraw their support from your paper because you refuse to advertise German goods. How rotten!

Would "R.O.W." have us forget all the millions of brave lives and millions and millions of money and thousands of cripples, and all the gallant motor cyclists who have become pilots in the R.F.C. and fallen in battle, and forgive, all because the Germans put the Bosch magneto on the market? If so, it is too foolish for words.

I wish your paper the best of luck, and hope you will stick to your guns and let Mr. Ives and his supporters withdraw their patronage and buy German goods. For my part, I shall never buy another German article of any kind, but support home industries and buy English motor cycles with all English parts, and support the workers that have fought for dear old England.

ROBERT S. TURNBULL.

FLYING FACTS AND THEORIES.

Sir,—I must thank "A Pilot" for his "hints to the young," but regret that he has misconstrued my second letter. This, I admit, bore little relation to my first, and was chiefly concerned with taking several remarks of Mr. Aston's very literally in order to find out whether or not they were so intended.

I have never directly stated, nor meant to infer, that an aeroplane needed no more power to sustain it on a turn than in straight flight, as this is almost an axiom. Incidentally, my letter was not written in anger or even sorrow.

With regard to Mr. Aston's contribution, as I have admitted above, I took his sentences literally, but I submit that I was not entirely unjustified in doing so, taking into consideration the remarks contained in the last paragraph of his article.

By "feel of the machine" I mean the feel of the controls, which tells anyone with experience when he is getting near stalling point; and also, if fit to be in the air alone, one can tell by feel whether one is banking correctly or not. Further, anyone who is any good at all flies by feel, and I am glad to say that the pretty little gibe contained in his (Mr. Aston's) last sentence falls entirely flat, and raises no reminiscent blush.

I would like to add that, when flying above clouds, one has a perfectly good cloud "horizon" to work with. Night flying and cloud flying are, of course, different, and frequently call for the use of instruments.

Mr. Aston further enquires how one is to know, when above clouds, which way the wind is blowing, and to this I would reply, "Compass."

Incidentally, anyone who read my letter carefully would have seen that I used the phrase "comic speedometers," etc., in connection with the cyclist only.

O.J.F.S.

Sir,—I remember hearing it stated that a nose-diving aeroplane cannot attain a speed of above 140 m.p.h. The reason given was that the air resistance at this speed balances the force of gravity, and that consequently further increase in speed is impossible.

If this be true—and I am not rashly asserting that it is not—can anyone explain how it is that a Bristol fighting plane is actually tested to dive at 260 m.p.h., and frequently performs this feat, the nominal limit being 300 m.p.h.?

A friend of mine recently dived at 160 m.p.h. in a RE 8, the result being a broken tail.

Surely if it is a question of air resistance, that resistance must depend on the size and type of machine, incidence of wings and tail, etc.

LOOT.

Ashton-under-Lyne.

ANOTHER LIGHTING PROBLEM.

Sir,—I wonder if one or two of the many readers who responded to "Chinook's" enquiry *re* electric lighting connections will be so good as to help me out of a similar difficulty. My problem is similar to "Chinook's," except that it is in connection with a solo mount.

(1.) How can I wire the set so as to obtain a good light from the front lamp, and just a glimmer from the rear lamp for ordinary running, while for leaving the machine in town at night-time I would like to have just a glimmer both front and rear?

(2.) What would be the most suitable accumulator to use in connection with, say, a 12 c.p. bulb in front?

(3.) What sort of bulb for the rear—candle-power and voltage?

(4.) What voltage would a 12 c.p. bulb require?

(5.) What make of bulb would be most suitable?

(6.) Where could I obtain the above accumulator and bulbs? I do not want a complete set like the Lucas.

R. PERCY.

FLYING IN A CURVED PATH.

Sir,—I note in your issue of January 17th a correspondent, "A.A.S." of Norwich, states that the rudder of an aeroplane is responsible for the loss of energy on turning.

The sketch represents an aeroplane about to turn. The rudder AB is deflected, and the air, after meeting it, is also deflected along AB. The air in being deflected causes a force to act on the rudder in direction CD, perpendicular to the plane of the rudder. The point is this, that no force acts on the rudder in direction AB, because the air is free to move in this direction. The only force which the rudder receives is a force along CD. It follows that the loss of energy is not in the rudder.

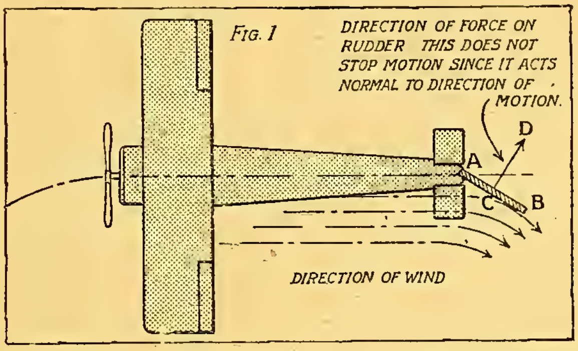
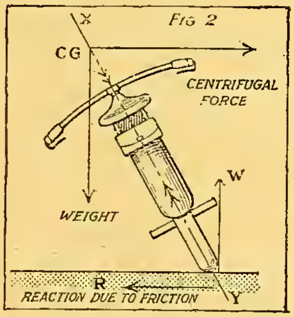
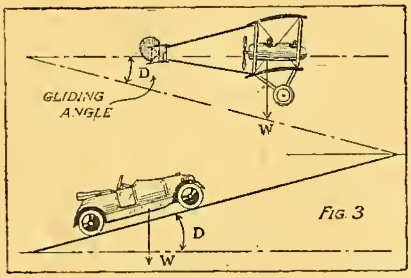


FIG. 1
DIRECTION OF FORCE ON RUDDER THIS DOES NOT STOP MOTION SINCE IT ACTS NORMAL TO DIRECTION OF MOTION.
D
A
C
B
DIRECTION OF WIND



Mr. Walmsley's explanation, which appeared in the issue for January 10th, is the correct one. The present-day aeroplane, when flying horizontally at a certain uniform speed, requires more power than a motor car of the same weight and resistance would require when travelling similarly. Consider the aeroplane turning. The centrifugal force and the weight produce a resultant which is greater than the weight. Now this greater force has to be balanced; and although no potential energy is gained, more power from engine is necessary.



The motor cycle, on turning, experiences similar forces, and there is no doubt that, owing to extra load on the bearings, more friction is set up, and consequently some loss of energy. The forces are shown in fig. 2.

Our problem is to construct a machine which will travel through the air with as little disturbance as possible. The more the air is disturbed, the more the petrol energy is absorbed.

THOMAS LOWNDES SIMMS.

Boy Welfare in the B.S.A. Works.

Extracts from a Lecture given on the Subject at the Company's Works.

GREAT interest is being taken at the present time in the welfare work at factories, particularly in looking after the boys and girls, and the following extracts will be of interest as showing the enthusiasm of the B.S.A. Co. in this direction:

"Boys entering a factory were very largely neglected, both by their employers and by their parents. Neither gave sufficient consideration to their future careers," said Mr. W. L. Baylay, O.B.E., of the B.S.A. Co., who, in the course of an address given before the B.S.A. Staff Technical Club, stated that the B.S.A. Co. had prepared a scheme, which aimed at improving the life and training of the boys in the B.S.A. employ, and the speaker regarded it as a matter of duty to the boys, rather than as a commercial and philanthropic undertaking. The lads were divided into two sections, skilled and unskilled, and those in the former section would receive a special training in one of the skilled trades, subject to the parents agreeing to keep the boys in the firm's employment until twenty-one years of age. Classes would be held in the B.S.A. works during factory hours, and instruction given on general subjects, such as the writing of a simple report, elementary mathematics, and drawing, etc. To boys over seventeen years of age more technical subjects would be taught, suitable to the particular vocation each boy was intended to follow. The success of this special training was, of course, largely dependent on the selection of the most suitable boys, and for this purpose a gentleman had been appointed, who would take a personal interest in each boy, and would keep a history of the boy and his progress. These records would be of advantage to the best boys as a recommendation for their advancement, and an incentive to the other boys to strive for a higher standard.

Mr. Baylay explained that, though it was not at present possible to deal with the unskilled boys on similar lines, he felt that a great deal could be done by giving them something more to live for than only their work. With this purpose in view, a gymnasium has been equipped, where, under the supervision of a fully qualified instructor, they are taugh Swedish drill and gymnastics. The keen ness and delight of the boys attending these classes are very encouraging. Thes were not war measures. In Mr. Bayley' opinion the boys' welfare movement now being introduced into the B.S.A. work will in time be made compulsory in all factories. Not only will it result in healthier, happier boys, but will also give those boys who wish to progress a reasonable certainty that their effort will receive suitable recognition.

The gymnasium at the B.S.A. works, where boys employed by the company are taught physical drill. A résumé of a lecture given by the B.S.A. Co. on the welfare of boys and girls in factories is given on this page.

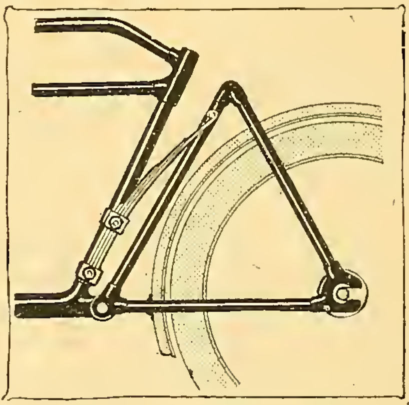
A Laminated Spring System for the Rear Wheel.

A Form of Springing which may be Adapted to Existing Machines with Slight Alteration.

THE employment of laminated springs and of a perfectly triangulated rear frame is the main point in the back wheel springing illustrated herewith. The design, which is by Pte. A. F. Markham, shows considerable ingenuity, and has several points not commonly embodied in such a system. Also, it could be fitted, with very little constructional alteration, to any existing machine of standard lines, and should involve a minimum of alteration to those small but important details that crop up when such an alteration comes to the point of being put into practice.

Removal of the Old Rear Frame.

It will be seen that the arrangement involves the removal of the old rear frame members, and the replacement of these by a specially constructed perfectly triangular rear frame, differing from the standard arrangement in the possession of a pivot at its forward apex and of a simple lug or bridge at the top, which is not provided with any means of receiving the saddle. This complete frame member is pivoted to the bottom bracket, as is the case in many of the new frame constructions, in such a way that it may revolve or give way when any shock is imparted to the road wheel. The amount of its movement is controlled by the action of a pair of laminated springs attached rigidly to the original down tube of the frame at some convenient point near the bottom bracket, one spring being on each side of the tube. The two tapered ends of these springs are attached to the movable frame member at the top extremities, *i.e.*, at their tapered ends.

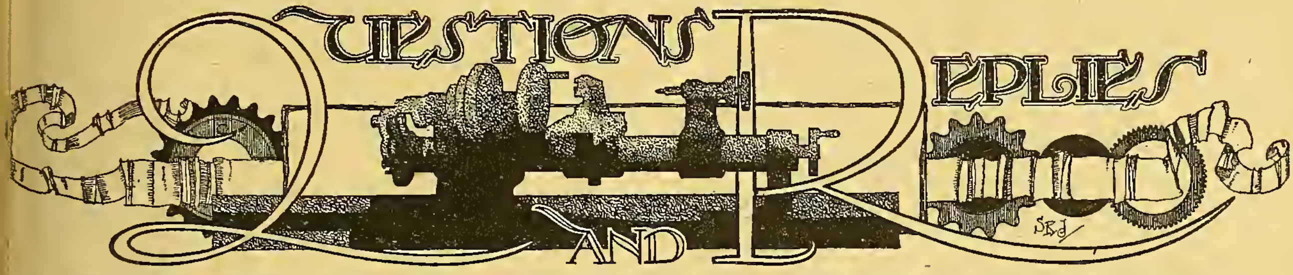


A rear springing system patented by Pte. A. F. Markham.

Reference to the sketch will make it clear that, should the wheel and its spindle receive a shock, the whole triangle of the movable frame will oscillate round the bottom bracket pivot, and that the extent of this movement will be naturally controlled and limited by the action of the two laminated springs.

A Simple Design.

The whole design seems very simple, and as it consists of a minimum number of moving parts it should have a claim to popular favour that is denied many of the latest spring frame designs. Also, we should be inclined to classify this design as one of the most easily adaptable to existing machines that has recently been brought to our notice.



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Altering the Angle of a Magneto.

May I ask the favour of your advice *re* a matter which I am at a loss to work out for myself? I have a 5 h.p. V twin engine, the cylinders of which are set at 58°, and also a magneto (twin-cylinder type, 45°). Is it possible to convert the magneto to suit my engine, and if so, what is the best method?—S.W.H.

onverting the magneto would entail oving one of the steel cams on the con-ct breaker 6½° further retarded. We ould not advise you to attempt to do is yourself, but to get it carried out a firm of magneto experts.

Lubricating the Gear Box.

I shall be much obliged if you will tell me how often the grease in the gear box of a machine of the Baby James type requires renewal, also whether there is any method of removing the old grease, except through the plug at the top of the gear box. I should also like to know how long a good rubber belt is supposed to last with ordinary care. The one I have at present shows signs of cracking, *i.e.*, the rubber is cracked, but I suppose that this does not necessarily mean that the belt is done for, as otherwise it appears to be in good condition. —H.G.H.

he grease will last two or three ousand miles, but a little gear oil ay be added to it occasionally. The vel of the grease should not be higher an the bottom of the gearshafts. here should be a drain plug at the ottom of the gear box, and the grease n be removed by washing out with araffin. Your belt should last about 000 miles; your present belt is not ecessarily past work yet.

Repairing Bowden Cables.

Would you be good enough to tell me the correct method of repairing Bowden wires and the necessary tools required for doing the job? I have had great difficulty in getting these replaced, and intend to try to mend them myself in future.—H.W.

you mean by repairing that you wish splice the ends of two broken wires gether we can assure you that this is uite out of the question. The only pairing that can be done to inside ires is in the way of cutting off frayed nd broken ends and resoldering the nipples. Even then, if the strands are separated, the amateur solderer is apt to experience much difficulty. Replacing nipples is quite an easy matter. If the wire is too long it is first dipped in flux and then sweated—that is to say, solder is run over it with a hot soldering iron. It can then be cut without fear of fraying. The nipple, which should be quite clean, of course, is then slipped over and pushed on until about an eighth of an inch is protruding beyond the head. Then dip the nipple in flux and hold it in a flame, when the solder will run and make a good joint. The projecting ends may now be burred over and further secured by a spot of solder. The tools required are a soldering outfit and combination pliers.

Altering a Magneto.

I have just bought a magneto, type DAv, for a twin Minerva. The magneto is intended to run anti-clockwise, but the engine driving connections run clockwise. Would you kindly let me know whether I can run the magneto clockwise without damage? If it is not possible to do this, would you let me know why?—F.E.H.

To render the magneto suitable for your machine it will be necessary to purchase from a dealer in magnetos a contact breaker designed to run in a clockwise direction. The contact breaker and the cams which operate it are the only parts of the instrument which decide which way it is to run.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week

Overheating.

I have a 3½ h.p. Kerry-Abingdon fitted with a B.S.A. carburetter and geared 4½ to 1, which runs very well on the level, but seems to lose power on hills and get very hot. The compression is fair, the valves are ground in, there is a very small shake in the connecting rod, the timing seems correct, and the magneto is adjusted with the lever retarded when the piston is at the top of the stroke. I drive with the spark fully advanced, the throttle three parts open, and about half-air. I should be grateful if you would tell me what is wrong and answer the following: (1.) Is the gear too high? (2.) A friend of mine has a 2½ h.p. two-stroke; should I be able to climb the same hills if my machine is geared the same? (3.) Should I retard the spark on hills? —F.B.

(1.) The gear is somewhat on the high side. (2.) Certainly you should be able to climb the same hills as a 2½ h.p. two-stroke. (3.) Retard the spark on hills if the engine labours or shows signs of distress. Also try the effect of a smaller jet and use good lubricating oil.

Pressure Tank for Coal Gas.

Owing to the present petrol restrictions, I propose making two sheet steel cylinders (5ft. long × 6in. diameter), and run them parallel with my machine, to extend well behind the back wheel, so as to allow movement of the front wheel. Will you kindly tell me how much gas the above cylinders would hold at 80 to 100 lb. per square inch pressure, and how many miles I ought to get from the above when fully charged, my machine being a 2¾ h.p. twin Enfield? Also, would it be necessary to fix back pressure valves between cylinders and engine?—H.H.

The capacity of each of your cylinders at the pressure you suggest would be about six cubic feet. The distance this amount of gas would run you depends entirely upon your fuel consumption in the ordinary way of things. Two hundred and fifty cubic feet of coal gas are equivalent to about one gallon of petrol; thus if your machine does normally 100 miles to the gallon, on the twelve cubic feet of coal gas that you have available it should do about five miles. You would require a pressure reducing valve between the gas containers and the engine, and also a gas reservoir. The tank might be utilised to function as the latter.

Difficulty in Removing Cylinder.

I recently bought a second-hand 8 h.p. twin J.A.P.-engined machine. In attempting to take off the cylinder the other day, I found that it would not come off. It will come until the bottom of the piston appears just below the base of the cylinder about half an inch, but not further. Please let me know if there are any means of getting the cylinder off without doing any damage. I tried paraffin and oil for several days, but it does no good.—M.C.

It might be possible to remove the cylinder by tapping the mouth of it gently with a wooden mallet, or it ought to come off by lifting and twisting at the same time. If this method fails, the only remedy is heating the base of the cylinder evenly all round with a blow-lamp. The engine should, of course, be removed from the frame.

Making a Small Water Injecting Valve.

I have seen many letters in your excellent journal from motor cyclists who have been enabled to use petrol substitutes by fitting a device for letting water drip into the cylinder through the compression tap. I also hear that this is a cure for pre-ignition and knocking. I want to fit such a device on my own machine, but I cannot see how to do so without losing compression. I have fitted a sparking plug with the electrode taken out in place of the compression tap. This, when joined to the copper pipe from my spare tank, forms a free channel for the water to flow through; but I see that I need some sort of valve. (1.) What is a needle valve? (2.) Is it a needle valve that I want? (3.) Please tell me how to make or where to get the valve you would recommend. I clearly see that I must fit some device so that the compression stroke cannot force the mixture up the water pipe, also so that the suction stroke cannot suck too much water into the cylinder. (4.) Please explain how the device works.—Enterprise.

(1.) A needle valve is a valve consisting of a single shaft with a pointed end ground into a cone-shaped seating. (2 and 3.) We should say the valve in question should be of the mushroom type, with a fairly strong spring, so that it would open on the suction stroke of the engine and allow a drop of water to pass, and would close again on the compression stroke. Unless you are a very clever amateur mechanic you will not be able to make such a valve. It would have to be turned up accurately. And also the seating of the valve would have to have the correct angle, a suitable non-rusting spring would have to be provided, and the parts would have to be all of brass. It would be a much simpler matter to utilise an old carbide generator and introduce your drip into the induction pipe, when it will be drawn into the engine with the charge. (4.) The success of the former device would depend very much upon the tension of the spring, as it is by controlling this that you would be able to regulate the quantity of water allowed to pass through on the suction stroke.

Improving the Silencer.

(1.) My silencer is quite empty. Is there anything I could fit in it to check the rather loud exhaust? The silencer is in front of the engine, and is fitted with a long back pipe. (2.) How far should the points of a magneto be apart for a $4\frac{1}{2}$ h.p. Singer with sidecar? (3.) I have had my carburetter repaired by the makers, but can only start up with the lever half open, when the machine will run all right; if I stop up the fixed air intake at the bottom with rag it will start quite easily with the lever barely open. Could I fix anything to open and shut the intake for easy starting? (4.) The clutch is on the engine-shaft; I have washed the plates. Should I begin to replace with a brass or steel plate? There are two steel plates, marked with "F's" over them. Does that mean they should be outside? If so, there are two brass plates one end running together.—D.W.S.

(1.) If you put anything inside the silencer, you are likely to throttle the exhaust, and consequently we should recommend either a longer extension pipe or that you flatten the end of the existing extension pipe, and cut about six vertical slits in it about 2in. apart, the first being about 3in. from the flattened end. (2.) .4 mm. (3.) This may be due to the bad petrol we are getting at the present time, or to the fact that rather too small a jet is fitted. If there is an air leak at the carburetter or induction pipe unions, this would cause the machine to start badly. Of course, you could easily fit a shutter to the fixed air intake of the carburetter, but this should not be necessary. (4.) The clutch should be assembled so that the bronze plates are in contact with the steel ones, *i.e.*, alternate bronze and steel. Probably you will start off with a bronze plate, as the body of the clutch will be of steel.

Knocking Under Load.

My machine runs all right in all three gears on the stand, but when out on the road I get a nasty knock on top gear as soon as I come to a bit of a hill, and yet I can climb anything I come to on second gear without any sign of knock. The machine used to run smoothly enough on top gear over anything. I have taken the cylinders off and cleaned the pistons, and the rings are all right. I have tried new plugs, have cleaned the carburetter out (Amac 32 jet), and have tried retarding the spark, but still I get the knock. The machine runs well on the level, but as soon as I come to a rise I get this nasty knock.—W.L.

Your gear is too high or the magneto is timed too early, or else you are using a plug which is unsuitable and causes pre-ignition. Present-day petrol might cause the knock, and the fitting of a cardboard joint, about the thickness of a dozen pages of *The Motor Cycle*, between the cylinder and crank case, would have the desirable effect of reducing the compression.

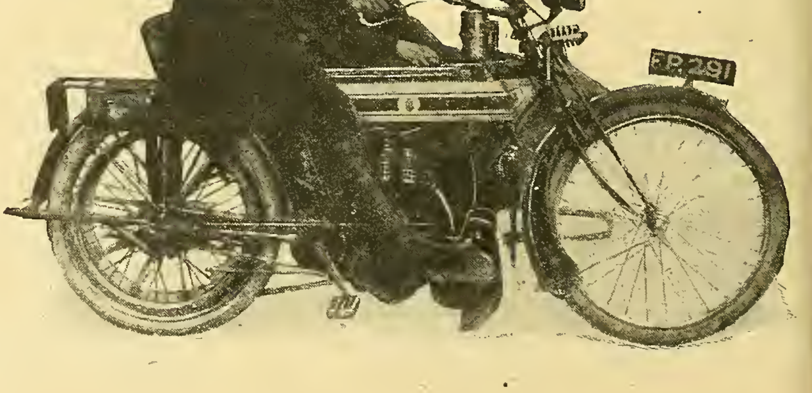
RECOMMENDED ROUTES.

Erith to Bristol.—M.N.

Erith, Woolwich, Charlton, Greenwich, New Cross Road, Peckham, Camberwell, Coldharbour Lane, Acre Lane, Battersea Rise, Wandsworth, Upper Richmond Road, Richmond, Twickenham, Hounslow, Slough, Maidenhead, Reading, Newbury Hungerford, Marlborough, Calne, Chippenham, Box, Bath, Bristol. Approximately 139 miles.

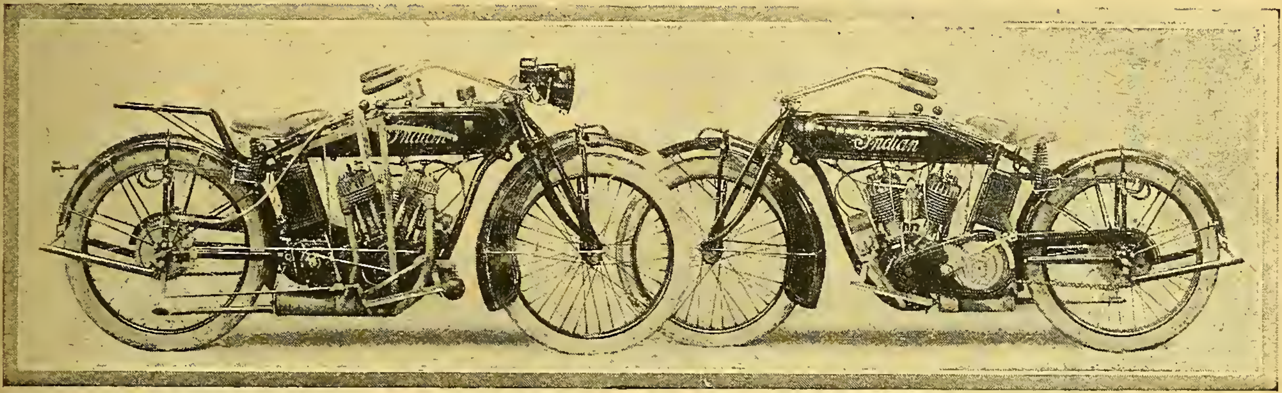
Wincanton to Cambridge.—R.B.

Wincanton, Hindon, Deptford, Amesbury, Andover, Highclere, Newbury Abingdon, Oxford, Bicester, Buckingham Stony Stratford, Newport Pagnell, Bedford, Eaton Socon, St. Neots, Eltisley Cambridge. Approximately 170 miles.



Nurse Maskell on her $3\frac{1}{2}$ h.p. single-geared 1912 clutch Triumph and sidecar. She is a keen motor cyclist, and finds the machine very useful in her work.

1918 Powerplus *Indian* Motocycles



Which we trust will be Post-War Models.

We regret that we are not in a position to supply motorcycles or send out catalogues at the present time, but when we are able to do so we will freely advertise the fact. This applies to Great Britain only.

HENDEE MANUFACTURING CO.,
"Indian House," 366-368, Euston Road, London, N.W.
Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA, 109-113, Russell St., Melbourne.
CANADIAN WORKS, 12-14, Mercer St., Toronto.
AFRICA. Indian House, 127-9, Commissioner Street, Johannesburg.
Indian House, 579, West Street, Durban.
Indian House, Strand Street, Port Elizabeth.

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A TYRE is worth the mileage it gives you—not what you pay for it. If you would know the value of a tyre (how it wears, if it is easily punctured or cut) you must ask a user of that Tyre—Many users of Beldam All British Tyres have recorded their experiences in a little Booklet entitled "Testimony," which will be sent post free on request. It will help to make clear to you why "once used always used" applies to Beldam Tyres, and that Quality, which means good service, always counts. It is because of the high quality of design, material, and workmanship that Beldam Tyres wear so long, and give such satisfaction.

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INVEST in a Beldam Retread: it will save you nearly the cost of a new tyre.

"I have done over 5,000 miles on the last retread you did for me about twelve months ago. I think it is money well spent in Beldam Retreads."
—A. G. W.

Send old covers of any make and we will quote you cost of retread.

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The Beldam Tyre Co., Ltd.
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Manchester: W. Briggs & Co., Bazaar Street, Pendleton. Ireland: P. Droban and Sons, Carrick-on-Suir; The Simms Boyd Co., 7, College Street, Belfast; Vickery's Bantry Motor Garage Co., Bantry. Cape Colony: The Tyre and Motor Co., Rodney Street, Port Elizabeth. Egypt: Valsamidis & Valsamis, 3, Rue Stamboul, Alexandria. New Zealand: J. E. Fitzgerald, 139, Lambton Quay, Wellington.

BELDAM
All British Tyres

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns—First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller. but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

Abingdon.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Abingdon King Dick, 1914, 4h.p., 3-speed, Philipson; 24 gns. (D) [3192

A.J.S.

A.J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

1916 A.J.S., 2¾h.p., 3-speed model, complete, lamps, etc.; £46.—Cross, Jeweller, Rotherham. [X1415

A.J.S. 4h.p. Standard Combination, 1915, low mileage, perfect mechanical order, fully equipped; £69. —Jameson, Kenton, Northumberland. [X1477

A.J.S., 1914, 2-speed, clutch, and K.S., all-chain drive, £37/15; 1913 model, £35; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1469

A.J.S. Motor Cycles.—Immediate delivery of the very latest 6h.p. models from stock. — The A.J.S. Specialists, The Walsall Garage, Walsall. Tel.: 444. [X9872

A.J.S., 4h.p., late 1915, renovated December, 1917, by A.J.S.. at cost of £30, perfect condition, as new, Mills-Fulford sidecar; offers.—Captain, 99, Kedleston Rd., Derby. [X1269

PLEASE Note, we can deliver the latest 6h.p. A.J.S. model from stock, price £91/16; also several other new machines from stock; please send for our lists.—The North Wales Motor Exchange, Chester St., Wrexham [X9884

SPECIAL OFFER to Doctors, Hospital Nurses, Farmers, etc.

1918	**A.J.S.,** 6 h.p., 3-speed, and Sidecar	£113 6
1918	**NORTON** Big 4, all-chain	75 Gns
1917	**ZENITH GRADUA,** twin	70 Gns
1917	**NEW IMPERIAL-J.A.P.**	44 Gns
1917	**NEW IMPERIAL-J.A.P.,** kick-starter	£54 6
1917	**NEW IMPERIAL,** lady's model, kick starter	£56/11/10
1917	**ROVER,** 5-6 h.p., W.O. model	£97 10
1917	**ROVER,** 5-6 h.p., W.O. model, and Sidecar	£124 5
1917	**ROVER,** 3-speed	£80 0
1917	**ROVER** T.T., Philipson pulley	£67 10
1917	**LEVIS,** 2½ h.p., 2-speed	£47 10
1917	**LEVIS,** 2½ h.p., single sp.	35 Gns
1917	**LEVIS POPULAR,** 2-stroke	£32 0
1917	**ROVER** T.T., Philipson pulley	50 Gns
1917	**ROVER** T.T., Philipson pulley, never ridden	55 Gns
1916	**ENFIELD,** 3 h.p., 2-speed	40 Gns
1916	**BROUGH,** 2-speed	45 Gns
1915	**A.J.S.,** 6 h.p., and Sidecar, with windscreen	80 Gns

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Biggest Light Car and Motor Cycle Dealers in the South.

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Motor Cycle Burberrys, lined proofed tweed or fleece.
Usual Price. 4 and 5 Gns.
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Write for Sale List of Bargains.

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Send for it !

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Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

LATEST Model A.J.S. Combination, military fini complete; £111/12/6.—Cross, Agent, Rotherham [X14

A.J.S. Motor Cycles.—Immediate delivery of spec 1917 model. complete, detachable wheels, 70 80 tyres; £91/6; trade supplied; no permits requir —P. J. Evans, Sole Agent for Birmingham and d trict. [X06

Alldays.

ALLON.—All new models; E.P. or exchange.—Serv Co., 292, High Holborn. W.C.1. [X14

ALLDAYS, 3h.p., tyres good, new saddle, accum lator, spring forks; £5.—39, Ringwood Rd., Ea bourne. [31

RIDER TROWARD and Co., 31 and 78, High Hampstead.—Allon, 1916, 2-stroke, 2-speed; gns. (D) [31

ALLON, 1917½, 2¾h.p., 2-stroke, 2-speed, equal ney, not done 250 miles; £38/10.—46, Mary E West Bromwich. [X14

ALLONS, new 2½h.p. 2-stroke models, 2-speed ge 40 gns.; extended payments, or exchanges.—W chope's, 9, Shoe Lane, London. [31

1913 Alldays Matchless, 3½h.p., 3-speed, £22; si car, £7/10; 2¼h.p. Motosacoche, £7/10.—Jo son, 61, Osborne Rd., Acton, W.3. [3

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-sp countershaft models in stock. [1

1914 Ariel Countershaft Combination, perfect; £ —Parker and Son, St. Ives, Hunts. [3

RIDER TROWARD and Co., 31 and 78, High Hampstead.—Ariel, 1913, T.T., 3½h.p.; 22 [3

ARIEL, 1917, 3½h.p., 3 speeds, not done 200 mi perfect condition; price £65.—Hildred, Hain Sq., Grimsby. [X1

Auto-Wheels.

1914 Auto-Wheel, in first-class order; £7.—Wa Cycle Co., Saffron Walden. [X1

1917 B.S.A. Auto-Wheel, almost new, and in fect order; £10.—Walbro Cycle Co., Saf Walden. [X1

RIDER TROWARD and Co., 31 and 78, High Hampstead.—Auto-Wheel, 1916, new condit mileage 200; 7 gns. (D) [3

Bat.

RIDER TROWARD and Co., 31 and 78, High Hampstead.—Bat-Jap, 1914, 6h.p., 3-speed, do seater sidecar; 42 gns. (D) [

6h.p. Bat, 1915, twin-cyl. J.A.P. engine, 2-speed round tank, chain-cum-belt; £45.—Seen at chope's, 9, Shoe Lane, London. [

BAT, 1916, 6h.p., 3-speed countershaft, Norton s ing coachbuilt sidecar, lamps, horn, perfect c tion; £55.—Seen 91, St. Margaret's Rd., St. Marga Middlesex. [X

Bradbury.

BRADBURY, 1912-13 3½h.p., 3 speeds, and c built sidecar; £35/10.—Motor Exchange, H St., Halifax. [

RIDER TROWARD and Co., 31 and 78, High Hampstead. — Bradbury, 1913, 4h.p., 2-s clutch, 19 gns.; Bradbury, 1914, 4h.p., 2-speed cou shaft, 29 gns. (D) [

MOTOR CYCLES FOR SALE.

Brough.

OUGH, 1916, 3½h.p. horizontal twin, 3-speed Sturmey-Archer countershaft gear, semi T.T. bars, of the Road lamp, Sparton warning signal, knee- Dunlop tyres, but little used and carefully; 0.—Seen at Wauchope's, 9, Shoe Lane, London. [3163

Brown.

DER TROWARD and Co., 31 and 78, High St., Hampstead.—Brown, 1910, 3½h.p., mechanical Bosch mag.; 11 gns. (D) [3174

B.S.A.

.A., free engine, in perfect order to ride away, spare tyre; £36.—113, Haldane Rd., East Ham. [X1391

15 B.S.A.. 4¼h.p., countershaft, Model K, lamps and speedometer; £50.—Parker and Son, St. Hunts. [3074

14 B.S.A. Model K, 3-speed gear box, and clutch, lamps, horn, and all accessories, all in lovely ; a great bargain, £33.—Walbro Cycle Co., Saffron en. [X1434

DER TROWARD and Co., 31 and 78, High St., Hampstead.—B.S.A., 1917, 4¼h.p., 3-speed, chain- belt combination, 72 gns.; B.S.A., 1913, 3½h.p., ed, clutch, pedal starter, 27 gns. (D) [3176

15 B.S.A. and Sidecar, 3-speed, kick starter, includes handsome coachbuilt sidecar, speedometer, s, tools, storm apron, spare petrol tank; bargain £55 the combination complete.—Wauchope's, 9, Lane, London [3164

16 B.S.A. Model K, with large Canoelet sidecar, 2½in. tyres all round, P. and H. lamp set, rear , Lucas horn, Smith speedometer, trip and season age; this combination has only been used 3 months, is like new; £55 only.—Walbro Cycle Co., Saffron lea. [X1431

Calthorpe.

16 Calthorpe, 2-stroke, lamps and horn; £30.—Parker and Son, St. Ives, Hunts. [3073

h.p. Calthorpe-Jap, 1915 model, smart machine, sound and reliable; £15. excellent bargain.— chope's, 9, Shoe Lane, London. [3157

LTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits ired.—P. J. Evans, 91, John Bright St., Birming- . [X0654

IDER TROWARD and Co., 31 and 78, High St., Hampstead.—Calthorpe, 1916, 2-speed, 2-stroke, ns.; Calthorpe-Jap, 1916, 2-speed, 26 gns.; Calpe-Jap, 1915, 2-speed, 23 gns.; all with clutch. (D) [3177

LTHORPE-J.A.P., 1916 model, 2-speed, speedometer, 3-note horn, head lamp, generator, rear p, Dunlop studded tyres, as new throughout; bar- , £30.—Mebes and Mebes, 154-6, Gt. Portland St., . Tel.: 3426 Mayfair. [3023

Chater-Lea.

HATER-LEA, 3½-4h.p., Bosch; £14, or exchange for engineer's tools.—151, Globe Rd., Mile End. [3141

Chater-Lea-Jap.

IDER TROWARD and Co., 31 and 78, High St., Hampstead.—Chater-Lea-Jap, 1914, 4h.p., 2-speed, ch, perfect; 22 gns. (D) [3180

Clyno.

15 Clyno Combination, 3-speed, kick starter; price £37.—S. Bates, 5, Canning Place, Grove Lane, mark Hill, Camberwell. [3077

LYNO 1913-14 Combination, 5-6h.p., 3-speed, spare wheel, lamp set, Cowey speedometer, horn, etc., e £59/10; extended payments or exchange.—Service , 292, High Holborn London, W.C.1. [X1459

IDER TROWARD and Co., 31 and 78, High St., Hampstead.—Clyno 1915 combination de Luxe, p., 3-speed, spare wheel, hood, screen, etc., 72 gns.; no, 1915, 2-speed, 2-stroke, 23 gns. (D) [3179

-6h.p. Clyno Combination, 3-speed, detachable wheels, spare wheel and tyre, and all accessories, hood screen, reliable in every way; unprecedented bargain £65.—Wauchope's, 9, Shoe Lane, London. [3158

h.p. Clyno Combination, 3-speed gear box, all-chain drive, good tyres, 3 lamps, speedometer, quantity spares, reg. Dec., 1913, brand new centre frame just t in; owner giving up owing to ill-health; cash £35, exchange; can be driven away any time.—Apply, 2, Victoria St., Grimsby. [X1403

Connaught.

IDER TROWARD and Co., 31 and 78, High St., Hampstead.—Connaught, 1915, 2¾h.p., 3-speed, 2- oke; 25 gns. (D) [3178

Coventry Eagle.

IDER TROWARD and Co., 31 and 78, High St., Hampstead.—Coventry Eagle, 1916, 2-speed, 2- oke; 26 gns. (D) [3181

Crescent.

IDER TROWARD and Co., 31 and 78, High St., Hampstead.—Crescent, 1917, 2-speed, 2-stroke; 26 s. (D) [3182

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Dalm.

RIDER TROWARD and Co, 31 and 78, High St., Hampstead.—Dalm, 1917, 2-stroke, mileage 200; 19 gns. (D) [3184

Diamond.

LATE 1915 Diamond, 2¾h.p., 2-stroke, new Dunlop tyres, Lucas lamps, horn, just been thoroughly overhauled, and in splendid condition throughout; £22, or nearest.—T. Morris, 13, Claudous Mansions, Rothbury Rd., Victoria Park, E.9. [3133

Douglas.

DOUGLAS, 1914, 4h.p., 2-speed, speedometer, sporting sidecar; £40.—57, Midland Rd., Bedford. [3122

DOUGLAS, 1912, 2-speed, new cyls., rings, etc., good condition; £21, approval.—Gibb, Worcester St., Gloucester. [X1486

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat. Yeovil. Tel.: 50. [5855

DOUGLAS. 2¾h.p., late 1915, 3-speed, in new condition; £43.—Apply, P. Camplin, Clive House, Ackworth, near Pontefract. [X1387

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

DOUGLAS, 1913, 2-speed, Bosch mag., £32/10; 1911 2¾h.p., with lamp and tools, £12/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1464

1915 2¾h.p. Douglas, U, semi-T.T. bars, footboards, Amac carburetter, excellent order, lamp, horn, tools, etc.; £35.—Robinson's Garage, Green St., Cambridge. [3156

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1915 2-speed Douglas, £42/10.—Motor Exchange, Horton St., Halifax. [3105

1916 2¾h.p. Douglas, makers' No. 29,606, Model W, 3-speed, clutch, kick start, upturned bars, footboards, 2 lamps, horn, speedometer, Dunlop tyres, in perfect order; £37/10.—Robinson's Garage, Green St., Cambridge. [3155

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Douglas, 1916, 4h.p., 3-speed, T.T., 59 gns.; 1914 T.T. model, 2-speed, 33 gns.; ditto, clutch, kick start, 34 gns.; 1913 T.T., 2-speed, 29 gns.; 1913 single speed, 21 gns.; 1911 single speed, 15 gns.; also several complete Douglas engines, frames, gears, etc. (D) [3183

MOTOR CYCLES FOR SALE.

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

1918 2¾h.p. Douglas, Model W, hand-controlled clutch, kick start, latest improvements, £54, plus 20%; also Models U and V, 1916 specification, £50, plus 10%; absolutely new; immediate delivery against priority permits for doctors, farmers, war and munition workers; how and where to apply.—Full particulars, write, Douglas Specialists, Robinson's Garage, Green St., Cambridge. [3154

Enfield.

ENFIELD 1915 6h.p. Combination, new condition; £55; seen any time.—29, St. Leonard's St., Bow Bridge. [3139

ENFIELD 1916 6h.p. Combination, well equipped, excellent order; 79 gns.—Motor Exchange, Horton St., Halifax. [3107

6h.p. Enfield Combination, splendid condition, carefully used, lamps, horn, etc.; £65, bargain.—Williams, Crescent, Taunton. [X1370

ROYAL Enfield 6h.p. Combination, 1915 (late), good condition, nearly new tyres; £55.—Beesley, 109, Trinity Rd., West Bromwich. [X1361

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Enfield 1917 combination, as new, 79 gns.; 1916 ditto, 74 gns. (D) [3185

1915-1916 Enfield Combination, smart turnout, reliable, completely overhauled; £67/10, bargain. —Wauchope's, 9, Shoe Lane, London. [3165

ENFIELD, late 1915, 3h.p. twin, and lightweight O.B. sidecar, £42/15; 1915 6h.p. combination, £76; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1470

1917 6h.p. Twin Enfield Combination, latest model, delivered June last, mileage 600, fitted with 3 lamps and generators (new and unused), special saddle, mechanical horn, engine carefully tuned, general condition perfect, and could not be detected from brand new, complete with following new spares, heavy driving chain, exhaust and inlet valves, 700×80 Palmer cord tyre, petrol, etc., for delivery; cash price £92; Midland district.—Write Box 1,624, c/o *The Motor Cycle.* [X1267

Excelsior.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—British Excelsior, 1916, 2-speed, 2-stroke; 26 gns. (D) [3175

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—American Excelsior, 1916, 7-9h.p., 3-speed, sporting coach sidecar; 75 gns. (D) [3171

LATE 1916 7-9h.p. American Excelsior, 3-speed, K.S., hand and foot clutch, needs slight attention, just like new; £50 spot.—46, Mary Rd., West Bromwich. [X1408

AMERICAN Excelsior Combination, 7h.p., 3-speed, kick starter, Bosch mag., mechanical lubrication, coachbuilt sidecar, 3 lamps, horn, etc.; best offer over £45.—Brown, 16, King St., Saffron Walden. [3100

AMERICAN Excelsior, brand new, 7h.p., 3-speed Model de Luxe, with dynamo electric lighting outfit, head lamp, tail-lamp, and electric horn, dual clutch control, Schebler carburetter, mechanical lubricator, and other latest improvements, £85; coachbuilt sidecar to match, with luggage carrier, petrol can carrier, wind screen, etc., £20; the finest value now offered in sidecar machines; no permit required.—The Premier Motor Co., Aston Rd., Birmingham. [3125

F.N.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—F.N., 1913, 6h.p., 2-speed, dropped frame; 26 gns. (D) [3186

F.N. 2½h.p. Lightweight, 2 speeds, clutch, shaft drive, absolutely reliable, and in perfect condition; £20. —H. Bax, Eldon, Weybridge. [X1383

Harley-Davidson.

1917 Harley-Davidson Combination, dynamo lighting, coach sidecar; £130, exchanges entertained.—Mitchell's Garage, Roundhay Rd., Leeds. [X1156

7-9h.p. Harley-Davidson 1915 Electrically Equipped Combination, hood, screen, and all accessories; £65.—Seen at Wauchope's, 9, Shoe Lane, London. [3160

HARLEY-DAVIDSON, olive green electric model, speedometer, absolutely new condition throughout, only run few miles; £95.—Box L5,497, c/o *The Motor Cycle.* [3094

HARLEY-DAVIDSON New 1917 Dynamo Combination, hood, screen, speedometer, etc.; £115, or exchange; any trial or examination.—53, Kingston Hill, Surrey. [3087

HARLEY-DAVIDSON Combination 1915, electrically equipped, aluminium disc wheels all round, hood and screen, etc.; £75; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1457

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Harley-Davidson, 1916, dynamo lighting, Bramble sidecar, hood, screen, 85 gns.; Harley-Davidson, 1916 mag., Phœnix sidecar, with detachable child's seat, 79 gns.; Harley-Davidson, 1915, dynamo lighting, attractive sidecar, 62 gns.; Harley-Davidson, special T.T., disc wheels, olive green finish, dynamo lighting, 69 gns.; all above 3-speed, 7-9h.p., hand and foot clutch, pedal start. (D) [3190

MOTOR CYCLES FOR SALE.

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1466

Henderson.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Henderson, 1915, 10h.p., 4-cyl., 2-speed, coach sidecar, disc wheels; 75 gns. (D) [3187

Hobart.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Hobart, 1915, 2-speed, 2-stroke; 23 gns. (D) [3168

Humber.

3½h.p. Humber and Sidecar, 2-speed, all accessories, splendid condition; £18.—Wells, 36, Gore Rd., South Hackney. [X1400

HUMBER 2¾h.p. Twin Lightweight, variable pulley, mechanical horn; bargain, £17.—Clifford, Patterson Place, Tannockside, Uddingston. [X1478

1917 4h.p. Flat Twin Humber, only ridden 200 miles, absolutely new and faultless; £50; first cheque secures.—Walbro Cycle Co., Saffron Walden. [X1430

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Humber, 1914, 3½h.p., 3-speed, underslung sidecar, 36 gns.; Humber, 1913, 3½h.p., 3-speed, coach sidecar, 29 gns.; Humber, 1912, 3½h.p., 2-speed, 22 gns. (D) [3189

HUMBER, late 1913, 3½h.p., 3-speed, Millford combination, all accessories, also quantity of spares, back wheel and all tyres new, 3-speed had £5 overhaul last month, machine uses substitute, or could be easily adapted for gas; any trial given; price £30.—Lieut. Maxwell, Shornmead Fort, Gravesend. [X1420

Indian.

INDIAN, 1912, 4h.p., 2 speeds, £22/10; 1912, 7-9h.p., single speed, £27/10.—Motor Exchange, Horton St., Halifax. [3108

INDIAN, late 1915, T.T., clutch, Lycett pan saddle, electric horn, new P. and H. lamps, quantity spares, mileage 4,000, perfect; bargain, £40.—Simpson, Carbis Bay, Cornwall. [3127

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Indian, 1915, 7-9h.p., 3-speed, Mills-Fulford 20 gn. coach sidecar, electric lighting, fine outfit, 59 gns.; Indian, 1914, 7-9h.p., 2-speed, clutch, kick start, coach sidecar, 44 gns.; Indian, 1915, T.T., 7-9 h.p., clutch, disc wheels, long exhaust, 39 gns.; ditto, standard T.T., 37 gns.; 1914, 7-9h.p., 2-speed, spring frame model, 34 gns.; 1914 T.T., 7-9h.p., clutch, 32 gns.; 1912 6h.p., 2-speed, clutch, 22 gns.; several sporting and touring Indian sidecars for sale; also most Indian parts and complete engine. (D) [3191

James.

JAMES 1916 Combination, 3 lamps, Jones, tools, first-class turnout, 3,000 miles, tyres good; £70.—H. Moore, Hawes. [3233

JAMES, all models, new and second-hand; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1458

BARGAIN.—James 4¼h.p. combination, bought 1916, all latest fittings, perfect condition, as new; cost £100, sacrifice £58/10.—Gortley, 12, Glenisla Gardens, Edinburgh. [X1362

Juno.

JUNO-VILLIERS, 1915, 2-stroke, 2 speeds, runs on paraffin; £24.—31, Greenfield Rd., St. Helens. [X1138

Kerry.

3½h.p. Kerry-Abingdon, spring forks, mag., Senspray carburetter, Abingdon free engine, all in perfect order; £10.—Walbro Cycle Co., Saffron Walden. [X1433

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Kerry-Abingdon, 1914, 4h.p., 3-speed, Philipson, 24 gns.; 1913 Kerry-Abingdon, 3½h.p., 2-speed, clutch, pedal start, coach sidecar, 24 gns. (D) [3193

Lea-Francis.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Lea-Francis, 1915, 3½h.p. twin J.A.P., all-chain drive, clutch, kick start; 48 gns. (D) [3194

Levis

LEVIS, 1915, Popular, Dunlops, recently overhauled by makers; cash, £18/10.—Liley, 30, Benson St., Liverpool. [X1271

Lincoln-Elk.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Lincoln-Elk, 1913, 3½h.p., waterproof Bosch, variable gear; 19 gns. (D) [3195

Matchless.

1914 Matchless Combination, 2-speed; price £35.—S. Bates, 5, Canning Place, Grove Lane, Denmark Hill, Camberwell. [3078

1917 Matchless War Model, lamps, horn, speedometer, mileage 2,000, spare wheel; £95.—Lieut. Smith, Warden, Sheppey. [3231

MATCHLESS 8h.p. Combination, new, fitted with J.A.P. or M.A.G. engines; extended payments or exchanges.—Service Co., 292, High Holborn, London, W.C.1. [X1460

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1915 **ALLDAYS ALLON**, 2¾ h.p., single-speed, good condition **£15 0**
1917 **ROVER**, T.T., Philipson pulley, 3½ h.p., lamps, horn, absolutely as new throughout **£45 0**
1917 **NEW IMPERIAL-J.A.P.**, 2¾ h.p., 2-speed, T.T. bars, only ridden a few times. Bargain **£30 0**

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MOTOR CYCLES FOR SALE.

Matchless.

RIDER TROWARD and Co., 31 and 78, High St Hampstead.—Matchless, 1915, 8h.p., 3-speed, coach sidecar, 59 gns.; 1913 6h.p., 2-speed, coach sidecar, 35 gns. (D) [3196

MATCHLESS 7-9h.p. 2-seater Combination, 3-speed countershaft, hood, screen, and all modern accessories, guaranteed 52 m.p.g.; what offers?—8, Ashton Lane, Sale. [X1416

MATCHLESS Combination. War Model, in perfect condition, new end 1917, only run 2,000 miles, fitted with large luxurious Cooper sidecar De Luxe hood, screen, speedometer, electric light, spare interchangeable wheel, consumption of substitute 56 m.p.g. cost new £150, a bargain for £135 cash; seen by appointment.—Box 1,654, c/o *The Motor Cycle.* [X1369

Minerva.

MINERVA, 2¾h.p., reliable machine, Amac, footboards, good tyres; £11.—118, Richmond Rd., Raynes Park, S.W. [3081

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Minerva, 1910, 3½h.p., mechanical valves, mag.; 11 gns. (D) [3197

Monopole.

MONOPOLE, 1916, 2½h.p., 2-speed, free engine; band clutch, Albion gear, lamps, separate generators, footboards, E.I.C. mag., Bates tyres nearly new, chain-cum-belt, very light torpedo (cane) sidecar, 3-point attachment, new rim, nearly new tyre (Bates), perfect order, spare cover, tubes, and belt, tools; exchange higher power combination; what offers?—C. Moseley Vickers, Ltd., Barrow-in-Furness. [X1483

M.M.C.

£6.—4h.p. M.M.C. motor cycle (accumulator), in good running order, with spare set of wheels; owner enlisted.—Flanagan, 8, Hightown Rd., Wrexham. [X1373

Motosacoche.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Motosacoche, 3½h.p. twin, Enfield gear, kick start, De Lissa valves, several models in stock; 1917 48 gns., 1916 44 gns., 1915 40 gns., 1914 32 gns.; sidecars, 6 to 8 gns. extra. (D) [3198

Nestor.

RIDER TROWARD and Co., 31 and 78, High St Hampstead.—Nestor, 1914, 4h.p., 3-speed, fine order; 24 gns. [3201

MOTOR CYCLES FOR SALE.

New Hudson.

RIDER TROWARD and Co., 31 and 78, High St Hampstead.—New Hudson, 1916, 2-stroke, 2-spee 25 gns.; New Hudson. 4h.p., 3-speed, countersha drive, coach sidecar, 37 gns.; New Hudson, 6h.p countershaft drive, 3-speed, coach sidecar, 59 gns. ([320

New Imperial.

CROW Bros., Guildford.—New Imperial, latest 2½h.p 3½h.p., 6h.p. models in stock· also sound secon hands. [104

1916 New Imperial-Jap, 2¾h.p., 2-speed, perfect ru ning order; bargain, £25.—Rollings, The Squa Dunstable. [X13

RIDER TROWARD and Co., 31 and 78, High St Hampstead.—New Imperial, 1915, 2¾h.p., speed; 23 gns. (D) [320

IMPERIAL-J.A.P., 2-speed, clutch model, £32/1 also new models in stock; E.P. or exchange.—Se vice Co., 292, High Holborn, W.C.1. [X14

NEW Imperial Motor Cycles, 2 speeds, clutch a kick starter, and lady's models in stock for i mediate delivery; trade supplied; no permits require —P. J. Evans, 91, John Bright St., Birmingham. [X06

Norton.

RIDER TROWARD and Co., 31 and 78, High S Hampstead.—Norton, 1914, T.T., Philipson; gns. (D) [31

NORTON.—Big 4 Military Model, all-chain, new; a chain-cum-belt; £57/10; E.P. or exchange.—S vice Co., 292, High Holborn, W.C.1. [X14

N.S.U.

N.S.U., 5-6h.p. twin, 2-speed, free engine, tyres goo £16 for quick sale.—Etcell, 39, Ringwood R Eastbourne. [31

RIDER TROWARD and Co., 31 and 78, High S Hampstead.—N.S.U., 1911, 6h.p. twin, 11 gn 1914 3h.p. twin, T.T., 24 gns. (D). [32

HAVING Acquired the Entire Stock-in-trade of t N.S.U. Motor Co., Ltd., we can now supply spa for practically all types of N.S.U. motor cycles ordering it is important to submit old parts as patter —Eagles and Co Acton Hill Works, Acton, W 3. [X14

N.U.T.

LATEST Model N.U.T., 3½-4h.p., free engine, speeds, kick start, J.A.P. engine, like new; £ complete.—Miller, 62, Hampstead Rd., N.W. [31

NUT-J.A.P., 6-8h.p., late 1914 combination, 3 spee clutch, new tyres all wheels, lamps, horn, to etc., Binks carburetter, perfect; officer will accept b offer before again proceeding Overseas. — Meadw R.F.C., Heathlands, Chadwell Heath, Essex. [X12

O.K.

O.K. Juniors.—Call and inspect at the N.W. dist agent, F. J. Youngs, 2-3, The Parade, Kilburn. [09

RIDER TROWARD and Co., 31 and 78, High Hampstead.—O.K., 1916, 2h.p., 2-speed, 22 gn 1915 ditto, 17 gns. (D) [3

Omega.

OMEGA, 2½h.p., 2-speed J.A.P., under 1,000 mi in good condition; £30.—W. Fox, Fonaby, Cais Lincoln. [3

Peugeot.

2h.p. Peugeot Lightweight, just completely enamel ignition needs attention; £4, offers.—Kenne Woodville, Hills Rd., Cambridge. [3

P. and M.

P. and M., 3½h.p., 2 speeds and sidecar, undersl chassis; £22/10.—Motor Exchange, Horton Halifax. [3

Precision.

RIDER TROWARD and Co., 31 and 78, High Hampstead.—Precision, 1914 T.T., disc wheels, gns.; 1914 4h.p., clutch, 19 gns.; 1913 3½h.p., 2-sp clutch, sidecar, 22 gns. (D) [3

Premier.

PREMIER, 2½h.p., 3-speed, clutch, 1915 model; £ seen any time; excellent condition; splendid gain.—F. Saunders, Ubique, Conyer, near Sittingbou [3

3½h.p. 1911 Premier, Armstrong 3-speed, clu Stewart horn, lamps, fine order and conditi bargain, £15.—Chaney, 20, Radnor St., Plymouth. [X1

PREMIER, 3½h.p., 3 speeds, and clutch, engine gears just overhauled by makers, like new, sidecar; £36, or near, or good push cycle part.—W Photographer, Huthwaite, Notts. [3

PREMIER, 1914, 3½h.p., 3-speed, clutch, and Stewart speedometer, lamp, and horn, £34/15; combination, £61/15; E.P. or exchange.—The Se Co., 292, High Holborn, W.C.1. [1

RIDER TROWARD and Co., 31 and 78, High Hampstead.—Premier, 1916 Military Model speed countershaft, coach sidecar, 52 gns.; 191 speed countershaft combination, 45 gns.; 1914 3-s combination, 37 gns.; 1914 3½h.p. 2-speed cou shaft, 29 gns.; 1913 3½h.p. 2-speed, clutch, pedal completely renovated, with new sidecar, 35 gns.; 3-speed, cane sidecar, 31 gns.; 1911 T.T., disc wh 15 gns. (D) [

MOTOR CYCLES FOR SALE.

Premier.

p. Premier, T.T., Bosch mag., speedometer, knee-grips, new Dunlop tyres, new cylinder and pis-ew F.R.S. lamp set, rear lamp, and Lucas horn, perfect order, enamel and plate good as new; e lot.—Walbro Cycle Co., Saffron Walden. [X1432

Radco.

04 Radco, 2-stroke, lamps, etc.; £15, offers.—143, Evington Rd., Leicester. [X1417

5 2½h.p. Radco 2-stroke, fine condition; must sell; £16.—30, Talbot St., Burnley. [X1389

ER TROWARD and Co., 31 and 78, High St., Hampstead.—Radco, 1914, 2½h.p., 2-stroke; 15 D) [3210

DCO, 1915, 2-speed, 2-stroke, 2¼h.p., good appearance; £21/10.—Motor Exchange, Horton St., x. [3109

DCO, 1917, 2½h.p., 2-stroke, as new; £25; ex-ended payments or exchange.—Service Co., 292, Holborn, London, W.C.1. [X1456

Rex.

4 Rex Twin 2-speed Combination, sound condition, requires reassembling; £30.—Dell, The In-y, Colindale Av., N.W.9. [X1374

6h.p. Combination, 2-speed, free engine, handle tarting, m.o. valves, waterproof mag.; £12, a a.—Killarney, Southsea Av., Leigh-on-Sea. [X1413

ER TROWARD and Co., 31 and 78, High St., Hampstead.—Rex 1910 6h.p. 2-speed combina- 19 gns.; Rex, 1912 3½h.p., T.T., Philipson, 19 Rex, 1914, 8h.p., T.T., clutch, 28 gns. (D) [3208

Rover.

VER.—All new models supplied; E.P. or exchange. —Service Co., 292, High Holborn, London. [X1461

ER TROWARD and Co., 31 and 78, High St., Hampstead.—Rover, 1913, 3½h.p., clutch; 22 gns. [3209

VER, 3½h.p., mag., B. and B. carburetter; bargain, £9/10.—152, Camberwell Grove, London, [3151

VER, 1915, T.T., 3½h.p., new condition, lamps, mechanical horn, etc.; bargain, £35.—King, Chem-Sutton, Surrey. [3136

SS'S Motor Mart have for sale a Rover, 1917, 3½h.p., complete, as new; £57/10.—5, Warren Euston Rd., W.1. Museum 623. [3103

VER Motor Cycles, 3½h.p. and 5-6h.p. models, in stock for immediate delivery, both solo and side-outfits; trade supplied; no permits required.—P. vans, 91, John Bright St., Birmingham. [X0653

Royal Ruby.

YAL Ruby.—All new models supplied; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1 [X1468

Rudge.

17 Rudge Multi and clutch, electric lighting, semi T.T. bars, as new; £55.—Seen at Wauchope's, hoe Lane, London. [3166

14 Rudge Multi Combination, 3½h.p., and Rudge coachbuilt sidecar, large lamp set, with car size generator, Stewart trip speedometer, Lucas horn, good condition throughout; bargain, £35.—Elce Co., 15-16, Bishopsgate Av., Camomile St., E.C. [0551

DER TROWARD and Co., 31 and 78, High St., Hampstead.—Rudge Multi, 1917, 48 gns.; 1916, sidecar, 52 gns.; 1914, underslung coach sidecar, s.; 1914 5-6h.p., 36 gns.; 1913 5-6h.p., sporting ar, 35 gns.; 1913 T.T., 27 gns.; all with Multi ; also 1912 3½h.p., 2-speed, 19 gns.; 1912 single , 17 gns.; and 1913, T.T., 22 gns.; also many e parts, including complete engines and N.S.U. (D) [3207

Scott.

OTT, 1913, Bosch mag.; £37/10; 2-speed, clutch, and kick starter; E.P. or exchange.—Service Co., High Holborn, W.C.1. [X1463

DER TROWARD and Co., 31 and 78, High St., Hampstead.—Scotts, 1915 37 gns., 1914 34 gns., 29 gns., 1912 25 gns., 1915 combination (as new) s.; nearly all Scott parts in stock; all above 3¾ 2-speed, twin, 2-stroke, water-cooled, clutch, kick , all-chain drive. (D) [3217

Sheffield Minor.

DER TROWARD and Co., 31 and 78, High St., Hampstead.—Sheffield Minor, 1916, 2½h.p., -2-e; 22 gns. (D) [3212

Singer.

h.p. Singer, 913, in good condition; what offers over £15?—Box L5,491, c/o *The Motor Cycle.* [3089

DER TROWARD and Co., 31 and 78, High St., Hampstead.—Singer, 1914, 2½h.p., 19 gns.; 1912 , 12 gns. (D) [3211

NGER Combination, 1913, 3½h.p., Armstrong 3-speed, Lucas lamp and horn, Stewart, Millford hbuilt sidecar, fine condition; £40.—Bayles, Owmby-pital, Lincoln. [X1404

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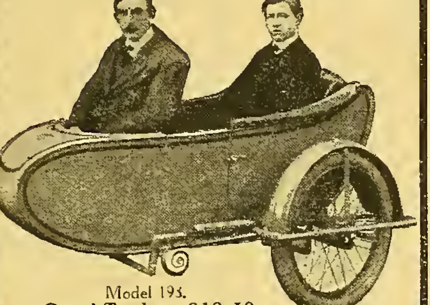

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MOTOR CYCLES FOR SALE.

Sparkbrook.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Sparkbrook, 1917, 2-speed, 2-stroke, as new; 27 gns. (D) [3213

Sun.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Sun-Jap, 1917, 8h.p., Sturmey countershaft, coach sidecar; 72 gns. (D) [3214

Sunbeam.

SUNBEAM, 2¾h.p., 2-speed, splendid condition; £32. —Ridge, Grove Rd., Horbury, Yorks. [X1386

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Sunbeam, 1916, 3½h.p., 3-speed, clutch, kick start, perfect; 65 gns. [3218

1916 8h.p. M.A.G. Sunbeam Combination, 4 interchangeable wheels, Lucas dynamo lighting set, wind screen, Cowey speedometer; seen in London; £120.—Box L5,486, c/o *The Motor Cycle.* (D) [3072

SUNBEAM 6h.p. Combination, complete, Lucas dynamo, electric lamps, horn, coachbuilt sidecar, spare wheel, etc.; outfit cost when new £135/10; has had little use, only ridden a few hundred miles, everything in perfect order; best offer over £100; see displayed advertisement in issue January 17th, page 4, for fuller particulars.—The House of Johnston, Ltd., Hamilton, N.B. [3238

Swift.

SWIFT and C.B. Sidecar, 1915-16, 3½h.p., clutch, and K.S., complete with lamp and horn, splendid condition; £49/10; E.P. or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1465

T.D.C.

T.D.C. De Luxe, 2¾h.p., 2-stroke, late 1916; 18 gns.; accept cycle part.—77, Acre Lane, S.W.2. [3138

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—T.D.C., 1917, 2-stroke, 19 gns.; T.D.C., 1914, 4h.p., 3-speed, 24 gns. (D) [3215

Torpedo.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Torpedo, 1913, 3½h.p., 2-speed, cane sidecar, 22 gns.; 1914 clutch model, 4h.p., 19 gns. (D) [3216

Triumph.

TRIUMPH, 1912-3, clutch, free engine, new Dunlops, gas and electric lights, tools, good condition; £25. —Daubney, Strafford Grove, Birdwell, Barnsley. [X1424a

MOTOR CYCLES FOR SALE.

Triumph.

TRIUMPH, 3½h.p., £17/10; 1912-3, Bosch mag., S.A. free-wheel clutch, £26/10; E.P. or exchange. —The Service Co., 292, High Holborn, W.C.1. [X1454

TRIUMPH, 1911, 3½h.p., 2-speed, perfect running order, coachbuilt sidecar, and spare wicker sidecar; seen any time; best over £20.—W. Watkins, Greenmount, Park Rd., Leyton. [3091

TRIUMPH Combination, 1916, 4¼h.p., countershaft, with 21 gn. Bramble sidecar, lamps and horn complete, in good condition; £72.—Hopkins, Canal Tavern, Leicester Row, Coventry. [X1484

TRIUMPH, 1912, 3½h.p., free engine, clutch model, Bosch mag., lamps, tools, in real good running order and condition throughout; £25.—G. Russell, Cherry Orchard, Lichfield, Staffs [X1405

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Triumphs, 1914 4h.p. 3-speed coachbuilt combination, 44 gns.; Triumph, 1914, 4h.p., 3-speed, clutch, pedal start, decompressor, fine order, 55 gns.; Triumph, 1913, 3½h.p., 3-speed, 29 gns.; Triumph, 1915, 4h.p., clutch, variable gear, 36 gns.; Triumph, 1914, T.T., clutch, red finish, 32 gns.; Triumph, 1913, 3½h.p., 2-speed, clutch, 26 gns.; Triumph, 1913, T.T., 23 gns.; Triumph, 1911, standard, 16 gns.; many Triumph parts stocked; one complete 1914 engine. (D) [3219

Trump.

TRUMP-J.A.P., 3½-4h.p., footboards; £19; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1455

Velocette.

VELOCETTE, 2-stroke, new September, 1917, little used, Lucas lamp and horn, mudshields, spares; bargain, £30, offers.—Box 1,631, c/o *The Motor Cycle.* [X1371

Vindec.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Vindec, 1916, 2-stroke, 2-speed; 25 gns. (D) [3221

Wolf.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Wolf, 1916, 2-stroke, as new; 22 gns. (D) [3220

Zenith.

ZENITH 1915 8h.p. Countershaft Combination, with 25 gn. double-seater sidecar; cost £100, sacrifice £55.—89, Selhurst Rd., South Norwood. [3149

1914 8h.p. Zenith, lamp and generator, and speedometer; price £26.—S. Bates, 5, Canning Place, Grove Lane, Denmark Hill, Camberwell. [3079

ZENITH, 4h.p. J.A.P. engine, Gradua variable gear, Bosch mag., Dunlop tyres, lamps, and horn, all grey finish, very good condition; £20.—The Premier Motor Co., Aston Rd., Birmingham. [3126

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Zenith-Graduas.—1916 4-5h.p. twin, T.T., 59 gns.; 1915 T.T., 8-10h.p., 90 bore, red, 48 gns.; 1913 6-8h.p., coach sidecar, 37 gns.; 1914 4h.p., 29 gns.; 1913 4h.p., 25 gns.; 1912 4h.p., 22 gns.; all above direct drive; one 1914 6-8h.p., coach sidecar, clutch, and kick start in wheel, 42 gns.; countershaft models include 1915 8h.p., Burberry sidecar, 58 gns.; 1914, underslung sidecar, 45 gns.; both with clutch and kick start; all Zeniths above have J.A.P. engines and Gradua gears. (D) [3222

Ladies' Motor Cycles.

2¾h.p. Lady's Douglas, clutch model; £35.—Seen at Wauchope's, 9, Shoe Lane, London. [3159

SUN V.T.S., 2-stroke, 2-speed, tyres practically unsoiled, all accessories, not done 200 miles; £37/10. —Mahon, Docking, King's Lynn, Norfolk. [3118

LADY'S Royal Ruby, 2½h.p. J.A.P. engine, 2-speed, kick starter, 1915 model, run about 1,500 miles, condition like new; offers.—Alves, Whithorn, Wigtownshire. [X1337

Miscellaneous.

LEVIS Motor Cycle, 2½h.p., 1917 type, everything as new; £30.

TRIUMPH Motor Cycle, 3½h.p., 1914 type, just been thoroughly overhauled and painted, in first-class running order; £48.—Ernest Moore, The Garage, Nantwich. [2719

COLLIER'S Motories, Deal St., Halifax, for motor cycle bargains; cash or exchange.

CALTHORPE 2-stroke, 1915, countershaft gear; 19 gns.—Collier's Motories.

DOUGLAS, 1913, 2¾h.p., 2 speeds, £31/10; 1912 single-speeder, 19 gns.; 1914 T.T. model, £36/10. —Collier's Motories.

ENFIELD 1914 6h.p. Coach Combination, in fine order; £62/10.—Collier's, Motories.

HUMBER, 3½h.p., single speeder, £11/10; 3½h.p., 2 speeds, £19/10.—Collier's Motories.

LINCOLN-ELK, 1914, countershaft 2-speed gear, belt and chain drive, underslung coach sidecar; £45.—Collier's Motories.

6h.p. Twin Rex and coachbuilt sidecar, good appearance; £23/10.—Collier's Motories.

COLLIER'S Motories are cash buyers of Enfield, A.J.S., and Sunbeam combinations.—Address, Deal St., Halifax. [3115

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Miscellaneous.

JAMES, 1915, 2¼h.p., 2-stroke, 2 speeds, excellent condition; £32.—See below.

JAMES, 1916, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £36.—See below.

JAMES, 1917, 2¼h.p., 2-stroke, 2 speeds, lamps and horn; £40.—See below.

ROYAL Enfield, 1916, 2¼h.p., 2-stroke, 2 speeds, lamps and horn; £38.—See below.

ROYAL Enfield, 1917, 3h.p., lamps, horn, and speedometer, as new; £50.—See below.

ROYAL Enfield Combination, 1915, 6h.p., lamps, horn, speedometer, etc.; £60.—See below.

ROYAL Enfield Combination, 1916, 6h.p., lamps, horn, and speedometer; £78.—See below.

ALLON, 1915, 2¾h.p., 2-stroke, excellent condition; £25.—See below

ALLON, 1916, 2¾h.p., 2-stroke, excellent condition; £30.—See below.

ALLON, 1917, 2¾h.p., 2-stroke, 2 speeds; £40.—See below.

CALTHORPE, 1915, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £27.—See below.

RUDGE, 1916, 3½h.p., Multi gear and clutch, lamps and horn; £42.—See below.

TRIUMPH Junior, 1915, 2¼h.p., 2-stroke, 2 speeds, lamps, horn, and speedometer; £36.—See below.

PREMIER, 1913, 3½h.p., countershaft gear and clutch, fitted with coachbuilt sidecar; £38.—See below.

SINGER Lightweight, 1912, 2h.p. model, in fine order; £15.—See below.

NEW Imperial-Jap, 1915, 2½h.p., 2-speed model; £27.—See below.

CLYNO Combination, 1914, 6h.p., hood, screen, detachable wheels and spare wheel, complete, lamps, horn, and speedometer; £62.—See below.

ALL the above motor cycles are ready for immediate delivery, and deferred payments can be arranged for any of them.—Write for further particulars and list B22 to the Eastern Garage Co, 418, Romford Rd., Forest Gate, E.7. Telephone No.: East Ham 490. Telegraphic Address: "Egaraco, London." [3131

6h.p. Motor Cycle, spring frame, Bosch, Senspray, 700×65 Dunlops; £15.—Wray, Highfield, Bubwith, Selby. [X1336

TRIUMPH, 1914, 3-speed S.A., £35; Douglas, 1912, 2-speed, £18; both good order.—Crick, Motor Works, Burgess Hill, Sussex. [X1376

CALTHORPE 2-stroke, £25; Douglas's, £32 upwards; Enfield, £24; Ivy, £24; New Imperial, £30; O.K., £23; Rover, 1916, £55.—Griffin's, 89, Gt. Portland St., W.1. [3140

MOTOR Agents.—I have in stock for immediate delivery 100 new motor cycles, A.J.S., Rover, New Imperial, Calthorpe, James, Connaught, and Hockley No permits required. Let me quote you.—P. J. Evans, 87, 89, and 91, John Bright St., Birmingham. [X0656

MAUDES'.—Norton, 1916, 3½ h.p., countershaft gear, Canoelet sidecar, bargain, £58; A.J.S., 1914, 6h.p., 3 speeds, sidecar, £55; Zenith, 1917, 4-5h.p. new sporting sidecar, £64; Clyno, 1917, 6h.p., 3 speeds, military model, sidecar, as new, £80; Douglas, 4h.p., 1915, sidecar, 3 speeds, £60; Clyno, 1914, 6h.p., 3 speeds, and sidecar, great bargain, £50; Rudge, 3½h.p., 2 speeds, £33; Scott 1914 twin, 2 speeds, £36; Lugton, 1915, 3½h.p., spring forks, £20; Calthorpe, 1915, 2 speeds, 2-stroke, £20; above is a short list of our stocks. Fullest particulars with pleasure; exchanges and easy payments arranged.—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [3230

BARGAINS.—7-9h.p. Harley-Davidson, 1915, and sidecar, £69/15; 7-9h.p. Harley-Davidson, 1914, £39/10; Scott, 1912, and sidecar, £29/15; B.S.A., 4¼ h.p., 1914, £37/10; Rudge, 3½h.p., 1912, Grado gear, £19/15; Auto-Wheel, £5/5; 1910 Douglas, free engine, £16/10; 3½h.p. 1911 2-speed Humber, £18/15; Rudge Multi, 5-6h.p., 1913, £35/10; Rex, 6h.p., 1909, £15/15; 1910 free engine Triumph, £14/15; 1911 free engine Triumph, £17/15; 4h.p. Bradbury, Grado gear, 1911, £18/15; 3½h.p. Singer, 1913, 3-speed, £24/15; twin Zenith, 1914, Gradua gear, £34/10; 3½h.p. Rex, 1910, £12/15; 3¼h.p. Excelsior, £4/19; 3h.p. Minerva, mag., £8/15; 2½h.p. Nestor, 2-stroke, 1914, £12/15; 2¾h.p. Sun-Villiers, 2-stroke, 1914, £15/15; 2¾h.p. T.D.C., 1915, £13/15; 2¾h.p. T.D.C., 1916, £15/10; 2¾h.p. Calthorpe-Jap, 1915, Enfield gear, £22/15; Crouch 1914 light car, detachable wheels, £77/10; Ford lorry, 1913, £55/10; Ford car, 1914, detachable wheels, £69/10; send for list giving detailed particulars.—Booths Motories, Halifax. 'Phone: 1062. [2973

SIDECAR ATTACHMENTS.

4h.p. Douglas Sidecar, genuine, brand new; £15, cost £18/18.—Walbro Cycle Co., Saffron Walden. [X1438

MILLFORD Corvette Coach Sidecar, in splendid order, suit Triumph.—Christie Bros., St. Andrews. [3086

SIDECAR, coachbuilt, by Bartlett, green enamel, 4-point coupling; £7/10.—185, Brighton Rd., South Croydon. [X1421

200 MOTOR CYCLES & CARS IN STOCK ! !

RIDER TROWARD & CO

Just before Xmas last we advertised in this paper a list of 120 odd Motor Cycles and Cars for sale. Certain sceptics, for reasons of their own, have asserted that we have never had as many as 120 machines and cars in stock at one time, and that we advertised machines we had not got. For their benefit we state that our present stock for sale is **201**, which we shall be pleased to prove to any caller under **£100 penalty**, to be given to any charity. This week we advertise in the small columns **59** different makes, totalling 124 machines—a selection only of our stock, which we rightly claim to be the largest in England. If you are wanting ANY MAKE of machine, look for our advertisement under correct heading in miscellaneous small advts. to-day. If the machine you require is not there, write to us to ask why.

Any machine advertised SOLD ON INSTALMENTS, quarter down, balance to suit purchaser, provided machine remains with us till paid for; garaged and insured free. An excellent opportunity is thus offered to obtain a good machine now at moderate price, before the end of the War, and the consequent rise in prices. BE READY to ride the moment Peace is declared, and secure your machine now. Any machine not suitable changed free within fortnight of purchase, and taken back in 12 months at £7 depreciation in part payment of a new model. Full lists free. Exchanges. War stock accepted

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SIDECAR ATTACHMENTS.

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CORONET Sidecars from £9/15; special model for Harley-Davidson, enamelled French grey.

CORONET Sidecars from £9/15; special model for Indians, enamelled red, 28in. tyre.

CORONET Sidecars; special coachbuilt model for lightweights, £9/15; illustrated list free.

CORONET Sidecars are made to suit any machine, and delivered from stock.

CORONET Sidecars.—Send for illustrated catalogue from Booths Motories, Portland Place, Halifax.

SIDECAR Wheels, lugs, mudguards, long lengths tubing; state requirements.—Booths Motories, Halifax.

CANOELET Coach Sidecar, £5/5; £20 2-seater coach sidecar, £8/15; Millford chassis, 35/-; Montgomery £13/13 sidecar, £8/15.—Booths Motories, Halifax. [2974

LARGE Canoelet Sidecar, painted green, in very good order, fit B.S.A.; £9 only.—Walbro Cycle Co., Saffron Walden. [X1435

THE Willowbrook Co., Leicester, solicit your enquiries for sidecars of all descriptions. Write for illustrated catalogue. [0718

CORONET Sidecar, coachbuilt, underslung chassis, as new; only wants seeing; £7.—Walbro Cycle Co., Saffron Walden. [X1436

BRITANNIC Sidecar, coachbuilt, underslung chassis, brand new, and must clear; £10, cost £15.—Walbro Cycle Co., Saffron Walden. [X1437

BASTONE'S for Sidecars.—New coachbuilt, complete with Michelin tyre, £9/15; also other models at clearance prices.—228, Pentonville Rd., King's Cross, London, N.1. [3235

PHŒNIX Sidecars, new and second-hand; also several new stock soiled to clear; 100 complete sidecars always in stock; list free.—Phœnix Sidecars, 736, Holloway Rd., London. [2333

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—Sidecars.—Indian Canoelet racer, 8 gns.; nearly new Indian Mills-Fulford, 11 gns.; Indian cane sidecar, 4 gns.; also a great variety of sidecars for other machines; state requirements. From 40/-. (1) [3225

SIDE-CARRIERS AND PARCEL-CARS.

ARIEL Tradesman's Sidecar, good condition; cost £21, take £7/10.—Robins, 1, Tulse Hill, S.W. [3150

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BASTONE'S for Bodies.—New light coachbuilt, £3 also other models, underslung, step, and 2-sea at clearance prices.—228, Pentonville Rd., King's C London, N.1. [3

PHŒNIX Coach, wicker, cane bodies, single and dem models in all colours; largest selection in trade; several stock soiled to clear; repairs, repain and re-upholstering a speciality; actual manufactu —Phœnix Sidecars, 736, Holloway Rd., London. [

SIDECAR Body Designs for the trade only. W ing, coloured, pencil, or line drawings of ori designs, also working drawings full sized or to sca Cooper's Vehicle Journal, Ltd., established designe the coach trade for over 80 years. Consult us whe signing new ideas.—20, Tudor St., London, E.C.4. [

HOODS, WIND SCREENS, ETC.

PHŒNIX Manufacture Hoods from 35/-, screens Immediate deliveries; special list.—Phœnix, Holloway Rd., N. [

WIND Screens, 7 patterns, for sidecars, 19/6, 30/-, 32/6, and 45/-; sidecar hoods, 37/6, and 52/6.—Juno Showrooms, 248, Bishopsgate, don. [

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£10 to any charity if I ever advertise any i nary bargains. Every car actually in stock all dates in following advertisements guaranteed rate.

£17/10.—8h.p. Rover 4-seater, dual, good cond 12h.p. Argyll 3-seater, Bosch, gate, dickey smart car, £20.

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£30.—12-16h.p. Brouhot chassis, gate; 20h.p. Iacq 25-cwt. van, £35; 18h.p. Wolseley van, dual, £45.

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£65.—Smart little 15h.p. Studebaker torpedo 4- Flanders model, 4-cyl. monobloc, gate dua tion, real bargain.

£75.—1914 10h.p. Adamson sporting cycle car, monobloc, enclosed valves, mechanical gate change gear box, underslung, streamline.

£85 each.—15h.p. 1913 Studebaker 2-seater, bloc, enclosed valves, smart; 15h.p. Germ seater, dickey, Zenith, gate.

£90 Each.—15.9h.p. R.C.H. torpedo, monobl closed valves, Bosch, Zenith, smart; 15 Paige torpedo, monobloc, enclosed valves, detac exceptional condition.

£100 Each.—Late 1914 11.9h.p. Belsize monobloc, Sankey detachable wheels; 10h.p Argo sporting 2-seater, streamline, disc wheels, monobloc, watertight Bosch, smart; 15.9h.p. Johnston torpedo, enclosed valves, 4-speed; speci 4-seater, English torpedo body, painted radiato tric self-starter; 1911 Lacre commercial, twin gate, Bosch, van; 2-ton Berliet chassis, twin £100.

£125 Each.—9h.p. Swift cycle car, monobl closed valves, wire wheels; 15.9h.p. Vul seater, enclosed valves, worm drive, Zenith; Turner light car, 4-cyl. monobloc, gate, worm detachables.

£135.—Perry light car, 9h.p., streamline enclosed valves, Sankey detachable whe m.p.g., smart car, splendid condition.

£145.—10h.p. 1915 Horstmann sporting lig streamline, detachable disc wheels, me starter, 4-cyl. monobloc, enclosed valves, excep smart.

£150.—11.9h.p. Belsize streamline 3-seater, lighting, detachable wheels, monobloc, valves, worm drive, dickey, smart.

£185.—12h.p. Siddeley-Deasy torpedo 4-seat closed valves, detachable wheels, worm watertight Bosch, Zenith, smart, and silent.

£225.—Late 1913 15.9h.p. Belsize streamli pedo, 80×150 Sankey detachable whe closed valves, monobloc unit, worm drive, 4 smart car.

£250 Each.—20h.p. Rolls-Royce 1-ton platfor 4-speed gate, Claudel, Bosch, detachabl 26h.p. Silent Knight 15-20-cwt. lorry, abo model, sleeve-valve engine, centre gate change tight Bosch, detachables, splendid condition.

£295.—1917 Beaver commercial chassis, al radiator, 20h.p., 4-cyl. monobloc, enclose Rubberine solids, almost new.

ABOVE Cars all on view. Please call. No Douglas S. Cox, the Absolutely Straigh Man, 6c, Lansdowne Hill, West Norwood, S

FEBRUARY 14TH. 1918.

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A High or Low Centre of Gravity and its Probable Influence upon Side-slip.

IN *The Motor Cycle* of last week there appeared a sketch of a very original motor cycle, having a five-cylinder rotary engine and a gear box placed immediately below the saddle. These two points, combined with the large size of the steering head, indicate a high centre of gravity, and it may be interesting to consider briefly and without going into mathematical details what effect this is likely to have upon side-slip. We remember that it was once stated that, as a motor cycle would be absolutely stable if its centre of gravity were below the point of support—*i.e.*, the road surface—it was desirable, in view of the impossibility of attaining this ideal to keep the centre of gravity as near the road as possible. This, of course, is incorrect. One of the means of maintaining the balance of a single track vehicle is by altering the position of the points of support, so that the straight line between these shall always be directly under the centre of gravity. Let us take a sledge hammer as an example. If this be balanced on the finger with the head upwards it will be found perfectly easy to keep it in an upright position, but if the shaft be placed uppermost the balance will at once become very difficult, and will require considerable skill. This is, of course, an extreme case, but it disproves the statement just quoted, and suggests that for easy balance it is not desirable that the centre of gravity of a motor cycle should be too low.

There is, however, another aspect of the case. When a motor cycle is being well ridden in a straight line along a smooth but slippery road, it will not side-slip because no force is present to cause it to do so, but when the wheel meets an obstruction which forces it in a sideways direction we encounter a new set of conditions and see why it is desirable that the weight should be kept low down. Again, let us take the analogy of the sledge hammer. If this is suspended head upwards by a piece of string a slight push or tap on the end of the shaft will result in considerable lateral displacement, but hang the hammer up by the shaft and it will be found that even a hard blow on the head has little effect. This shows that a low centre of gravity is able to resist the side thrusts caused by obstructions, and thus it enables the motor cycle to maintain a straight course.

The whole question is one of the best compromise. When the centre of gravity is high the wheels are more easily deflected from their course, but given a certain deflection, say three inches, the machine and rider are placed rather less out of the vertical than would be the case if the centre of gravity were low, and balance is more easily regained. This, however, does not exhaust the matter, and we have to remember that a motor cycle which has begun to slip will be much more likely to continue to do so than that a slip should be set in motion in a machine which is steadily following its true path, owing to the difference between static and sliding friction. Our object must therefore be to arrest all tendency to side-slip at its origin.

To sum up, we are of opinion that, inasmuch as it is an easy matter to maintain balance so long as the wheels grip the road, it is best to keep the centre of gravity fairly low, but not to go to an extreme.

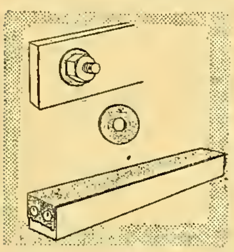
We have not thought it well to discuss gyroscopic action, centrifugal force, and cornering here, as we have in hand articles on these subjects written by our technical contributors, but our endeavour has been to put forward a few simple thoughts in simple language, and we should be glad to have our readers' opinions on this important question. The general tendency is, and we think rightly, towards the provision of a low centre of gravity.

An index to the advertisements in this issue will be found on the page facing the back cover

IDEAS: Useful and Ingenious.

USE OF EMERY CLOTH.

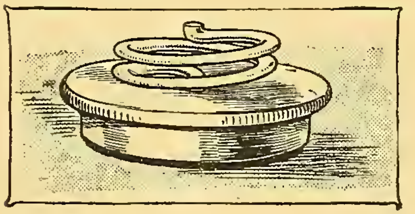
IT is best to procure engineers' emery-cloth. This has a number of uses in the motor house. If a spring washer is required to secure a nut which insists upon getting loose, and one cannot be found, a washer cut out of emery-cloth will often do just as well.


An improvised tool sharpener and spring washer

A useful tool for smoothing down flat surfaces for sharpening tools or for polishing the heads of pistons can be made by cutting a strip of emery-cloth, say about two inches wide, and fixing it on to a block of wood a good inch shorter than the cloth. The ends of the cloth should be then bent over and secured to the block by means of drawing pins.—*L'Automobile aux Armées.*

VENTING A PETROL TANK

A FOOLPROOF arrangement for venting a motor cycle petrol tank may be made from a helix of $\frac{1}{4}$in. diameter brass pipe soldered into the filler cap, two complete coils being found quite sufficient.


The helix of brass piping used as vent for a petrol tank.

I have been using it for some time on my own motor cycles—first a Rudge, and now a Douglas, fitted exactly as illustrated, and found it very satisfactory.

When I first thought of the idea I fancied it was novel, but, on investigation, I find this is not so, as a similar arrangement was used by the Vauxhall people on the radiator filler cap on their Grand Prix cars.

I never appreciated how much fuel was being lost on my Rudge until one day, being short of petrol, I filled up with a quantity of paraffin. Almost immediately leaks showed everywhere—at the doping cock, at the main cock, and at the filler cap, but the last-named was much the worst, and the leak from it was sufficient to cause drops of fuel to collect on the side of the tank, and these were blown back on to my legs.

Now I can fill up, if necessary, right into the bung of the filler without a drop coming out. On the Douglas I have removed the glass window from the filler cap and soldered a brass plate in its place, which carries the vent pipe shown. At the same time I have soldered up the existing vent hole, which was drilled about half-way up the threaded portion of the filler which is soldered to the tank. —F.G.S.

FITTING A HOT AIR INLET.

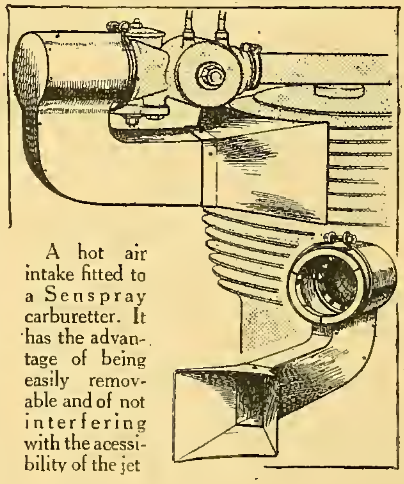
THE sketch illustrates a hot air inlet which has been fitted to the air inlet of a Senspray carburetter on a $3\frac{1}{2}$ h.p. Rudge motor cycle.

This fitting has been in use since early last year with quite satisfactory results, and even in the summer time there was no necessity to remove it.

It simply slips into place on top of the existing portion of the Senspray carburetter, which carries the gauze sleeve, this gauze being left in place.

To get at the jet the only thing necessary is to slack off the screw of the clamping band, when the whole fitting can be swung round in an anti-clockwise direction, viewed from the rear, leaving the hexagon head of the jet easily getat-able.

The fitting actually illustrated was made from 22 S.W.G. sheet aluminium, flanged and riveted together with $\frac{1}{16}$in. copper rivets. This makes a very neat construction, but quite good results can be obtained by using ordinary sheet tin and soldering along the edges.

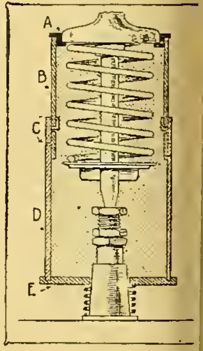

A hot air intake fitted to a Senspray carburetter. It has the advantage of being easily removable and of not interfering with the acessibility of the jet

Careful consumption tests were mad in the summer over a distance of 128 mile on a dry, but by no means easy, cross country trip, and it was found that th machine was doing 92 m.p.g. at an al through average of 28 m.p.h.

Owing to the construction of the carbu retter, all the incoming air is nicel warmed, and the whole of the blow-bacl is trapped and made to furnish its shar of the mixture.—F.G.S.

USEFUL VALVE COVER.

A CAPTAIN in the Royal Engineer sends the following description of valve cover he has found useful He says: "The valve covers were mad for a 1915 Triumph I ride here in France They have been in use six weeks now, and are very efficient and neat. Although the idea may not be new, I send you the sketch in the hope that it may prove useful to some readers of your splendid paper. I think the drawing is more or less self-explanatory, but append list of parts lettered in.



A convenient valve stem cover

"A. Brass ring turned Z section to fit top cup and inside diameter of smaller brass tube.

"B. Length of $\frac{1}{16}$in. brass tube.

"D. Length of $\frac{1}{16}$in. brass tube to exactly over B.

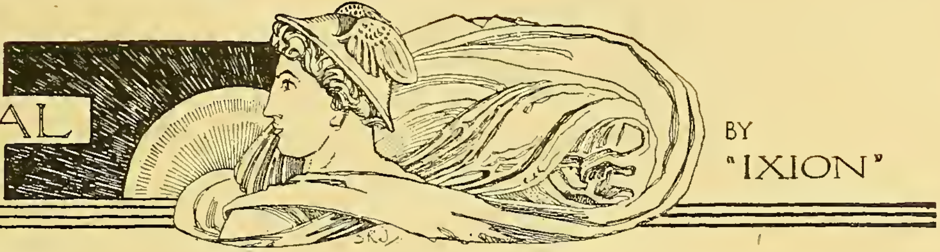
"E. Brass disc to fit over tappet guid and with slot provided for lower end of

"C. Quarter-inch piece of tubing as Cut in half, and with two L-shaped stu in each half. These studs engage in slo cut in B.

"The coil spring is to put pressure the whole."

AN INFLATION TIP.

A TIP picked up in Australia, whi has saved a good many long wall if not a few lives (the distan between water being so great in t Never Never Land), is that a tyre c easily be inflated without the aid of pump connection. One thickness of —a handkerchief, say—is interposed tween the valve and pump where t connection usually fits. The air pas readily enough through one thickness handkerchief, and if the pump is h firmly against the valve scarcely a air escapes.—D V LESTER, Hatfi Peverel



OCCASIONAL COMMENTS

BY "IXION"

Over-gearing.

SEVERAL recent correspondents have been trenching on the old controversy of overgearing *v.* undergearing. Before the war anybody who bragged of having covered a long hilly run without a gear change was immediately classed as a liar or accused of grossly undergearing, according to his personal reputation and the route covered. On the other hand, anybody whose front pulley emulated a bread trencher in diameter, or whose front sprocket seemed to be swanking it over the countershaft sprocket, was scoffed at for overgearing. The "undergearing" school seems to have influenced the trade. In the old days the 3½ h.p. solo machine was usually sent out with a gear of about 4 to 1. This ratio was not very useful in hilly districts, but it gave you a nice margin for running the belt in. By the time you had got the stretch out, you were usually down to about 5 to 1, as the average amateur generally shortened not wisely but too well. Having arrived at the lower ratio, you found the machine climbed better, and did not require quite so many miles in which to whack up to its maximum; so you stayed there till you sold. When the trade ratted to the belt-cum-chain or all-chain drive, ratios became less elastic. The harshness of the drive, and the fear of conks at low speeds and in picking up, inspired a general reduction of top gear ratios, for which the sidecar also bore some responsibility, and of late years several 3½ h.p. and even 5 h.p. twins have been delivered to me with fixed top gears of 5 to 1, or even less. If my top gear is fixed, I must say that 4¾ is my preferential maximum for a 3½ h.p. or 5 h.p., and 5½ for a 350 c.c. This, of course, is where a really good four-speed gear comes in. My present mount is of that character, and possesses a normal top gear of 5½, which is actually its second ratio (*i.e.*, third speed). In reserve above that is the freak top gear of 4½, to which one very seldom troubles to change up, unless faced by a longish piece of very favourable road. Of course, a box of this kind is simply a nuisance, unless it is very, very good. If it is noisy or frictional, your normal top of 5½ is spoilt, and though you can occasionally find use for a freak top of 4½ to 1, it is not worth sacrificing either efficiency or silence on the 5½ to get the 4½.

Where Three Speeds Score.

THE real blessing of three speeds is specially recognised in driving sidecars and the 350 c.c. solos. The 2¾ h.p. Douglas used to be equipped with two gears of about 5½ and 8¼ respectively, and any owner who ventured in mountainous country with his engine a "wee bit saft," soon found himself sighing for a lower ratio. To start with, the Douglas people built a few competition mounts with two gears of 5½ and 11½, or thereabouts; and the weakness of this system was felt in moderately hilly districts; the high was too high, and the low was too low. Much the same applied to driving the staunch old P. and M. with a sidecar attached. There was no intermediate stage between conking out on the top and grinding away painfully on the low ratios, 5½ and 11, as near as I can remember. Sidecars and little 'uns want three gears; and want them in the sense of being very decidedly imperfect with less. I daresay our Scottish critic will agree?

Will there be Any for US?

THERE is a distinct chance that motor cyclists will soon feel the need of a strong association to watch over their interests more than they have ever felt it before; and the A.C.U. may be given a unique chance to make good. Rumour threatens that all ordinary war workers will be completely deprived of petrol by June at the latest, and offered gas as a substitute. As far as I know, very few solo riders still possess petrol permits; but there are some survivors, and their need of fuel is presumably acute, or they would have been combed out long ago. We cannot use gas; it is an infernal nuisance on sidecars, and absolutely out of court, at present, in solo work. When the new restrictions are drafted, taking it for granted that rumour for once is not lying, will the case of the solo motor cyclist be considered? I speak quite disinterestedly, as the matter does not affect me personally in the least.

Inconsistencies.

AS a matter of fact, there are many loopholes remaining in the control of fuel, as it exists to-day. For example, I know of a certain munition factory—I must describe the case "diagrammatically," as the draughtsmen say, for certain reasons, and can only give a general idea of it. Let us suppose that the designer, the works manager, and the buyer of materials all legitimately require the assistance of a motor on occasions; that, conceivably, circumstances may arise when all three must travel in different directions simultaneously, and at great speed. It would nevertheless be absurd to allot these magnates a very powerful car apiece, when a small one would do. It would be absurd for them to travel a mile from their private residences to the works by car two or three times per day. It would be absurd for them to use cars instead of trains, if their works are close to a main line with as good a service as one can expect in these days. At least, all these things would be absurd if the shortage of petrol is as acute as other regulations imply. There is no denying that most of the discontent about fuel restrictions arises from *contrasts*, from uneven handling by officials of two similar cases.

The Late Mr. H. Walter Staner.

A Tribute by Sec.-Lt. G. Geoffrey Smith, R.F.C., Late Editor of "The Motor Cycle."

A STAUNCH champion has been lost to motorists and the motoring movement in general by the death of Mr. H. Walter Staner, for seventeen years editor of *The Autocar*. By the irony of fate he has been called away to the great Unknown at a time when so many of his colleagues who had learned to love him are scattered the world over; some, too, who owe a successful career largely to his kindly encouragement and help. Many will not learn of his sudden and sad departure until long after his mortal remains have been laid to rest, but none the less real will be the pangs of regret at the loss of such an esteemed leader and friend.

To those more intimately associated with the late Mr. Staner, the task of offering a fitting tribute becomes the harder, for acquaintanceship in this case will remain a permanent and glorious memory. Ever ready to encourage and assist, willing at all time to give a sympathetic hearing to young or old, whatever their position, duty with Mr. Staner dissipated many of life's worries. His charming manner, his considerate treatment of all subordinates, his ready help and guidance, won for him the respect and esteem of all. Mr. Staner possessed a receptive mind and the highest ideals; no suggestion, however extreme, failed to receive due consideration, and he unstintingly meted out praise where praise was due. The more difficult the problems that confronted him the more he seemed to revel in their solution; what had originally appeared a mountain became the proverbial molehill under his intuitively sagacious handling.

The late Mr. H. Walter Staner.

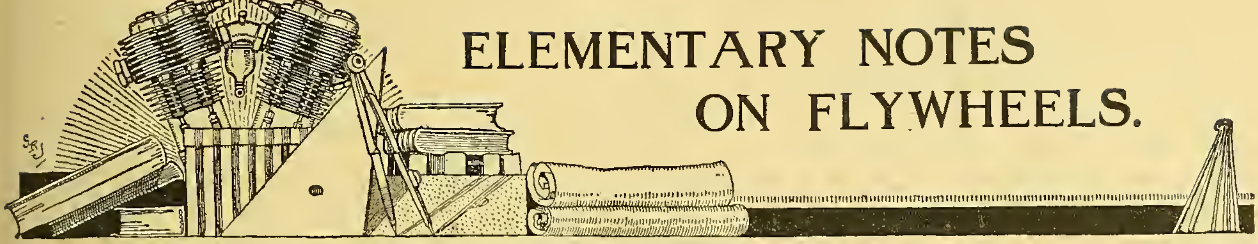
To the great army of motor cyclists Mr. Staner was known only as Editor of our parent journal, *The Autocar*, but behind the scenes he played a greater and more active part in the motor cycle world than was apparent to the ordinary beholder. He it was who forecasted the future of the four-cylinder motor cycle as long ago as 1905; and it was not long afterwards, at another dinner of the Auto Cycle Union, that he proposed a Tourist Trophy Race for motor cycles—a suggestion which was adopted the following year, with what result we all know, for what is a year of peace without a motor cyclists' T.T.?

Since Mr. Staner was a great admirer of mechanical efficiency, his ideal motor cycle was none of the variably geared clutch model mounts; his admiration was reserved for the light sporting T.T. mount shorn of all unnecessary impedimenta—a thing of life, instantly responsive to the throttle. The same ideals he cherished in the car world, and in conversation, when indulging in flights of fancy, he would constantly refer to the light T.T. motor bicycle being exemplified in cars ere long. Time will show whether his prognostications will become accomplished facts. Sluggish, inefficient machines he abhorred. One of his most laughable sayings—and he frequently used the most amusing expressions, full of meaning by way of illustration—was that the pressing of the accelerator pedal on a vehicle with a sluggish, woolly engine was like kicking a blancmange—a most expressive phrase, but one which would not occur to everyone.

Far seeing and quick to grasp the possibilities of any new design, however freakish it might appear to less imaginative people at the time of its introduction, he always perceived its real merits and gave words of encouragement to inventors which helped forward subsequent developments. How many standard features of modern cars owe their rapid development to Mr. Staner's fertile brain it would be difficult to say. The four-cylinder engine, the low flush-sided body, the sloping dash, the gate change, the four-speed gear—all received his unstinted approval at the time of their introduction years ago, and their rapid adoption was in no small measure due to his advocacy. Although he was never at any time enamoured of the cycle car, yet he cherished a sincere regard fo the air-cooled engine, and was optimistic as to it adoption on cars in the future.

One of his pet ideas was an air-cooled radial-typ engine placed between the driver and front passenge as on the old Lanchesters. Never tired of discussin engineering problems, he was as much at home o locomotive and steam engine practice as he was on car and motor cycles, and his wide study and soun judgment on all questions mechanical rendered him tower of strength.

Mr. Staner's greatest pleasure consisted in givin pleasure to others. In matters remote from busine his advice was sought and obtained in the friendlie possible manner. Courtesy, kindness, and co sideration for others were realities to his nob mind. To think that he is gone touches t deepest emotions. His was a noble life: an exampl an inspiration.



ELEMENTARY NOTES ON FLYWHEELS.

Some Notes and Personal Ideas on Flywheels in Theory and Practice, including a Few Arguments in favour of the Outside Flywheel.

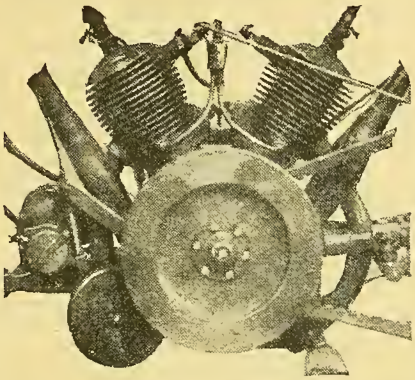
EVERY motor cyclist of understanding realises as time goes on that the outside flywheel will become more and more the common order. Its employment in connection with internal combustion engines for vehicle propulsion dates back, although it may be assumed that the system really became popular in motor cycle design with the Douglas and two-stroke lightweight. It was adopted in the case of the latter on account of the fact that it admitted of a crank case of small capacity, which simplified matters in connection with crank case compression. Similarly, the outside flywheel was adopted for the flat twin on account of the double-throw crank, which in itself was of considerable width, so that it was found convenient to place the flywheel on the outside of the driving sprocket, rather than build the crank case of sufficient width to receive it.

This—on the outside of the drive—is the proper place for a flywheel. In one or two freakish instances it is placed on the opposite end of the crank to the driving wheel, with the result that the stresses on the crank are reversed at every impulse of the engine, thus demanding a very much heavier crank if the risk of whip and breakage is to be eliminated.

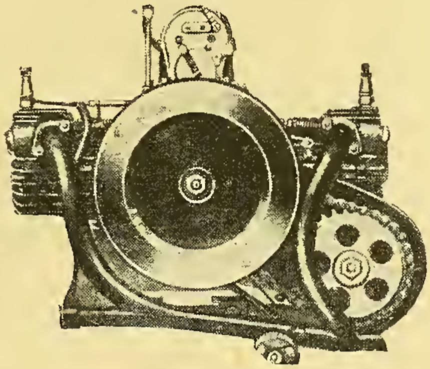
Advantages of the System.

So far, however, the outside flywheel is practically limited to two-strokes and flat twins, but its general application to other types is only a matter of time. It will be recalled that the single-cylinder Blackburne—an engine most remarkable for its even torque and steady pulling on gradients—employed an outside flywheel, as also did the Premier 90° twin and the Buckingham twin.

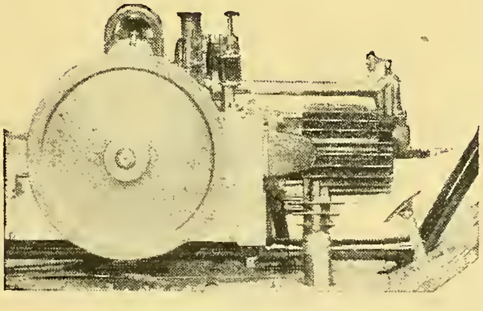
What are the distinct advantages of the outside flywheel compared with the inside type? Foremost may be set down the elimination of oil friction. The inside flywheel is always in contact with the oil contained in the crank case, with the result that an overdose of lubricant causes excessive friction. Riders of long experience who can recall the early types of inside flywheel engines, with their shallow crank case clearance, will recollect clearly how the least indiscrimination in administering the oil led to a loss of power. The fact that insufficient space was left between the flywheel and the inside of the crank case resulted in the flywheels being constantly retarded by the oil, just as a spinning cycle wheel would be retarded and quickly arrested if immersed in a trough of water. This, then, makes it clear why quicker acceleration and steadier pulling are more possible with an outside flywheel than with the inside type.



The Sun two-stroke.



The Douglas.



The Wooler two-stroke.

TYPES OF MODERN ENGINES FITTED WITH OUTSIDE FLYWHEELS.

Weight of Flywheels.

The question of weight also enters into the matter.

The flywheel is the heaviest component in the construction of the engine, and therefore it is the first point at which to aim in attempting to reduce weight. Clearly, the kinetic energy of a flywheel is dependent upon two things—the weight of its periphery and the distance from the centre at which the weight takes effect. Thus a flywheel having its weight one foot from its centre—that is a flywheel two feet in diameter—would be more efficient than one 6in. in diameter, even though the latter were fourteen or fifteen times the weight of the other.

By employing an outside flywheel we are not limited as to its diameter, so that, instead of making it stumpy and heavy, we can make it wide and light, having most of its weight near the periphery.

Naturally, the weight of the flywheel necessary depends upon

Elementary Notes on Flywheels.—

the impulses of the engine. A 1,000 c.c. single-cylinder engine would obviously require a flywheel four times the weight of a four-cylinder 1,000 c.c. engine. In every-day practice we have an example in, say, the Scott two-stroke with its even torque and its flywheel weighing approximately 14 or 15 lb., and the 4 h.p. Bradbury, or any other of similar type, the flywheels of which probably each weigh something in the vicinity of 28 or 30 lb.

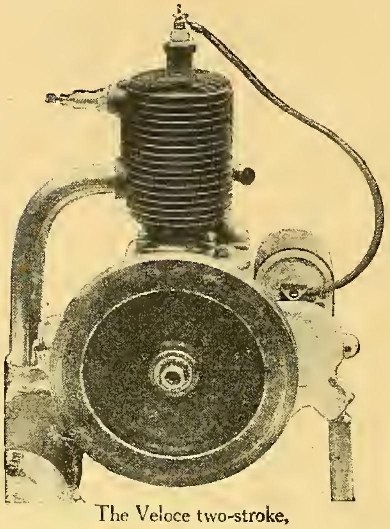
The Four-cylinder Type.

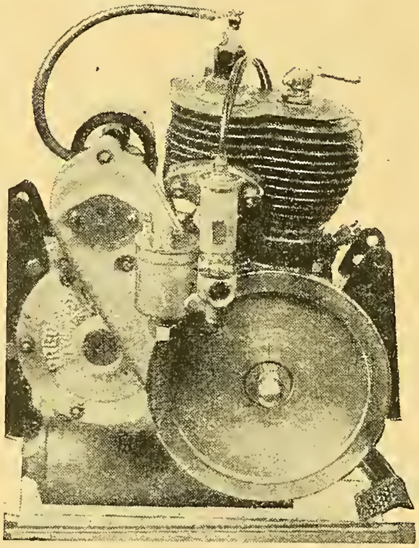
The four-cylinder Henderson is among the lightest motor cycle power units on the market for its capacity, while the single-cylinder is the heaviest type that can be reached.

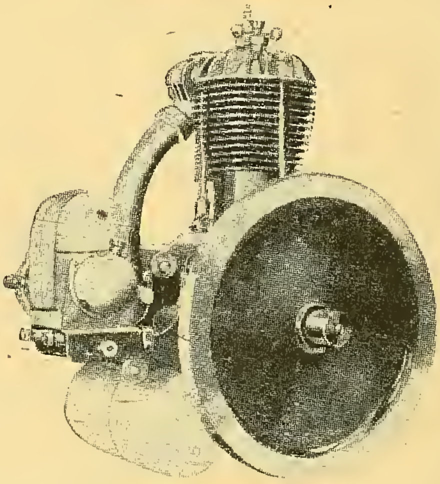
In practice the most suitable weight of flywheel depends largely upon the work for which the machine is intended. Fixed rules, of course, are laid down which can be safely followed, but most engineers prefer to ignore them and work according to their own ideas. For instance, a single-cylinder machine for sidecar use would be far more satisfactory for that purpose if it possessed a flywheel capable of high kinetic energy—which, for brevity's sake, we will refer to as a heavy flywheel—than if it possessed one on the light side. The flywheel acts as a shock absorber, and absorbs as it were the thrust of the power impulse, delivering it evenly over the succeeding 1½ revolutions, so that the heavier the flywheel the less violently is the power impulse imparted to the transmission, and the more evenly is it delivered over the succeeding 1½ revolutions. It assists also in hill-climbing, for when high "revs" have been obtained a heavy flywheel naturally helps the engine in keeping up its beat on a gradient of short length. If, however, the gradient continues and the "revs" steadily fall, the weight of the flywheel is no longer an advantage.

High Kinetic Energy.

A flywheel with high kinetic energy is desirable for sidecar machines from another point of view; in that it enables the engine to take up the load from a standing start without undue strain. Every rider of a Scott, or, say, a Brough, knows that he must be careful how he lets in his clutch, as the engine can be brought to a sudden stop by careless manipulation owing to its light flywheel. On the 4 h.p. Bradbury already referred to, however, an easy start is assured, even though it be attempted on a severe gradient or the clutch let in rather roughly. Similarly, a heavy flywheel, which acts as a natural reservoir, saves the tyres and the transmission throughout—in fact, adds to the general durability of the machine, though it naturally renders very rapid acceleration impossible. Therefore in racing machines the weight of the flywheel is cut down, so that they can move rapidly off the mark and pick up instantly after slacking at corners.


The Veloce two-stroke,


The Precision four-stroke.


The Blackburne four-stroke.

TYPES OF MODERN ENGINES FITTED WITH OUTSIDE FLYWHEELS.

Economising in Material.

Much yet remains to be done in motor cycle design in economising weight and material. The ordinary inside flywheel machine is a very poor example of economy in these directions. In four-cylinder design the flywheel is, at any rate, utilised in functioning as a member of the clutch, but in ordinary motor cycle practice not even this economy is attempted. Nor is it particularly desirable. It is better that the clutch should run at half engine speed than full engine speed, and therefore taking into consideration the proper distribution of weight the countershaft is undoubtedly the best place for the clutch.

The flywheel, however, might be used for another purpose, viz., for generating electricity for lighting and ignition, as is already done in the American motor scooter. We should thus do away with two weighty units—the magneto and the dynamo. We should employ, of course, a coil for ignition purposes in accordance with American practice, and the lamps could be lighted directly from the flywheel. Doubtless this will come in time, and having taken all these points into consideration there is no doubt that the outside flywheel not only tends in the direction of higher all-round efficiency, but lessens the weight considerably.

Summed up briefly the conclusion is: We find it desirable for efficiency to employ a flywheel of ample width; this cannot be done with the inside type, because there is not room for it, and because the wider we make it the greater the loss by oil friction. CHINOOK.

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A typical example of the thoroughness of B.S.A. methods is the unrivalled finish which distinguishes all B.S.A. productions. Even the smallest detail of B.S.A. Motor Bicycles bears emphatic proof of the claim "Perfect in every Part." B.S.A. finish is the final touch to perfect material and workmanship, and is undoubtedly one of the features which make B.S.A. owners so justly proud of their machines. Besides possessing the merit of attractiveness, B.S.A. finish has proved its durability. Under severe riding conditions it both wears well and is extremely weather resisting.

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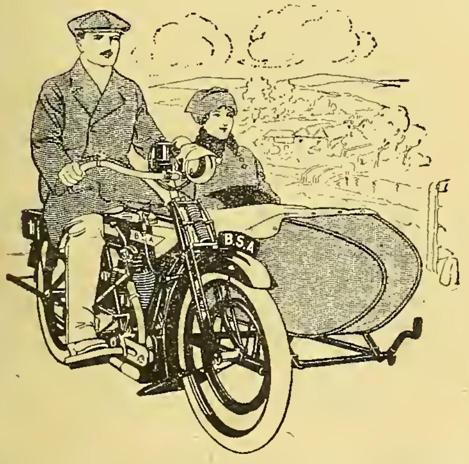

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£10 REWARD.

£10 will be paid for information which may lead to the recovery of a "Royal Enfield" 6 h.p. Combination. Registration No. MX 6681, Engine No. W 5071. Special screen and hood, Watford speedometer No. 705, 1915 make. Also the same amount will be paid for similar information leading to the recovery of a 1914/15 3½ h.p. Twin "Zenith," Engine No. 52830, mag. chain case slightly damaged. "Matchless" 8B Model, Engine No. 34572, Frame No. 3041, Regd. No. LR 3768 undertank tube cracked at head.

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Jacket with Belt - £2 10 0
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Dunhills, Ltd.,

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359-361, Euston Road, N.W.

Manchester:
90 & 92, Cross Street.

Glasgow:
72, St. Vincent Street.

The sale of this book is fast approaching a **quarter of a million copies**

— which proves its usefulness to motor cyclists.

"Motor Cycles and How to Manage Them" is, in fact, the one book that no motor cyclist should be without.

This edition (the eighteenth) is bigger than ever and better than ever—over 350 pages, with more than 400 illustrations, covering all types of machines and every conceivable aspect of their care and management. Each part of the machine, from engine to speedometer, is fully dealt with.

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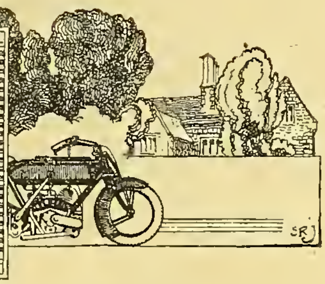


SOME NOTES ON H.P. OF PETROL ENGINES.

Interesting Tables and Formulæ showing how the Power Output of a Motor Cycle Engine is Utilised.

For finding the h.p. developed by an engine there are three well-known ways, (1) by means of a brake test, (2) by driving an electrical generator whose efficiency at any output is known, and (3) by the use of an indicator. As regards steam engines, No. 1 is seldom used, No. 2 occasionally, and No. 3 most often. The indicator diagram being also of great use in verifying the setting of the valves, it is even more used for this purpose than for calculating i.h.p.

With petrol engines different forms of the brake test are employed, but the prominent manufacturers use the electrical method (No. 2), as being more suitable for turning out batches of engines to a certain standard, the indicator being only used for research work on a particular engine. Owing to the great number of revolutions per minute of the small petrol engine, it was some time before a satisfactory indicator diagram could be obtained, but a few years ago a beautiful and accurate instrument was devised which overcame all difficulties.

Fig. 1 shows an indicator diagram such as would be obtained from a petrol engine. The great value of the indicator diagram at the time it was first used was to show the behaviour in the cylinder of the gases with various types (high and low compression) of engines, and with variations of compression and ignition timing on the same engine.

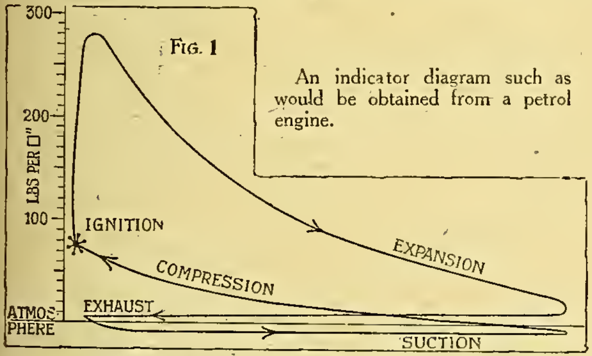


FIG. 1

An indicator diagram such as would be obtained from a petrol engine.

It is not intended to go further into this matter here than to say that it was found that in the *normal* engine at about full load an *average* pressure of 80 lb. per square inch acted on the piston during the power stroke.

It is this information which it is proposed to utilise here, and it must be borne in mind that in the figures given below the high-compressioned specially-fitted racing engine is not referred to, but only the ordinary every-day working unit such as that fitted to a touring motor cycle.

A table is given showing the calculated i.h.p. at different revolutions per minute, the engine working at about full throttle opening, so as to give the 80 lb. per square inch mean effective pressure. A gear of 4 to 1 is assumed, and the road speeds corresponding to the engine revolutions with 26in. wheels are worked out. Other calculations have been made, and the formulæ are explained where necessary. The machine is assumed to be a 500 c.c. in touring trim, weight of machine and rider 450 lb., and windage area 4.5 square feet. The proportion of i.h.p. available at road wheel is taken at 85%.

TABLE I.

Miles per Hour.	R.P.M. of Engine.	Calculated I.H.P.	H.P. Available at Road Wheel.	H.P. Air Resistance.	H.P. Available for Gradient.	Gradient the Machine will Mount.
15	775	2.38	2.02	.174	1.84	1 in 9.7
20	1033	3.18	2.7	.41	2.29	1 in 10.5
30	1550	4.77	4.05	1.4	2.65	1 in 13.5
40	2066	6.36	5.4	3.2	2 2	1 in 21.8
50	2583	7.94	6.75	6.45	0.3	
60	3100	9.52	8.08	11.2		

It will be evident that the limit of speed on the road for the machine is apparently just over 50 m.p.h. If the windage area were cut in half (as is found possible on racing machines), and a higher compression used (giving greater mean effective pressure during power stroke), a speed of eighty miles per hour is possible, as records show.

Calculation of I.H.P.

The formula given is adapted from the well-known $\frac{PLAN}{33{,}000}$. It may be used for any size of engine independently of the number of cylinders, provided the full cubical capacity is taken into account. The formula is for four-stroke engines only.

Let L = length of stroke (feet).
A = area of piston head (sq. in.)
P = mean effective pressure during power stroke.
V = engine capacity in cubic inches = 12 LA.
r.p.m. = revs. per minute = 2 N (N being the number of power strokes per min.)

$$\text{Then i.h.p.} = \frac{P \times \frac{V}{12} \times \frac{\text{r.p.m.}}{2}}{33{,}000} = \frac{P \times V \times \text{r.p.m.}}{2 \times 12 \times 33{,}000}$$

Some Notes on H.P. of Petrol Engines.—

since P for our purposes is taken as constant at 80 lb. per square inch.

$$\text{Then i.h.p.} = \frac{80 \times V \times \text{r.p.m.}}{2 \times 12 \times 33{,}000} = \frac{V \times \text{r.p.m.}}{9{,}900}$$

To facilitate calculations the following should be noted:

1,000 c.c. = 61 cubic inches.
500 ,, = 30.5 ,, ,,
100 ,, = 6.1 ,, ,,
50 ,, = 3.05 ,, ,,

Example 1.—About what is the maximum h.p. developed by a 350 c.c. engine running at 2,500 r.p.m.?

Volume of 350 c.c. in cubic inches = 21.35.

$$\text{I.H.P.} = \frac{21.35 \times 2{,}500}{9{,}900} = 5.4$$

H.P. at road wheel, say 85% = 4.6.

Example 2.—A 1,075 c.c. engine is running full throttle at 1,500 revs. What h.p. is being developed?

Volume of 1,075 c.c. = 65.6 cubic inches.

$$\text{I.H.P.} = \frac{65.6 \times 1{,}500}{9{,}900} = 9.95, \text{ say 10 i.h.p.}$$

Formulæ used in obtaining Results shown in Table I.

These include several well-known formulæ. For obtaining the h.p. absorbed by wind resistance, we have (as given in text books)

$$\text{H.P.} = \frac{S^3A}{87{,}300}$$

Where S = velocity of wind in relation to machine in miles per hour.
= on calm day, m.p.h. of machine.
A = windage area exposed. Taken in this article as 4.5 square feet for ordinary touring 500 c.c. machine. (Note.—This area is always in square feet.)

Some Practical Applications.

Example 1.—What h.p. will be absorbed by wind resistance with ordinary 500 c.c. machine at thirty miles per hour speed on road on a calm day?

$$\text{H.P.} = \frac{30 \times 30 \times 30 \times 4.5}{87{,}300} = 1.4$$

Gradients.—H.P. absorbed by gradients. (The weight of rider and machine is assumed to be 450 lb. in table.)

Let gradient be expressed as $\frac{1}{G}$ or 1 in G.

Let speed be expressed as m.p.h.

Let weight be expressed as W.

Then

$$\frac{\frac{5.280}{60}\ \text{m.p.h.} \times \frac{1}{G} \times W}{33{,}000} = \text{h.p.}$$

$$= \frac{.0026\ \text{m.p.h.} \times W}{G}$$

Example.—What is the h.p. expended due to gradient alone on climbing a rise of 1 in 10 at 20 m.p.h.?

$$\text{H.P.} = \frac{.0026 \times 20 \times 450}{10} = 2.34$$

Further problems are given which will be of interest.

(1.) With an engine developing power as shown in Table I., weight of rider and machine 450 lb., what gear would be required to mount a 1 in 5 gradient at 20 m.p.h.?

In solving this problem it is first necessary to find the h.p. required.

H.P. absorbed by wind resistance = .41 (by formula)
H.P. absorbed by gradient = 4.68 ,,
Total h.p. required at road wheel = 5.09

$$\text{I.H.P.} = \frac{5.09 \times 100}{85} = 5.9$$

We have previously seen that $\text{i.h.p.} = \frac{V \times \text{r.p.m.}}{9{,}900}$

Substituting 5.9 for i.h.p.:

$$\text{R.P.M.} = \frac{5.9 \times 9{,}900}{30.5}$$
$$= 1{,}915 \text{ r.p.m.}$$

With 26in. wheels, 1,915 r.p.m. of engine at 20 m.p.h. road speed means gear of 7.6 to 1.

(2.) In the above example, what is the probable *highest* speed at which the machine would mount the gradient of 1 in 5, and with what gear?

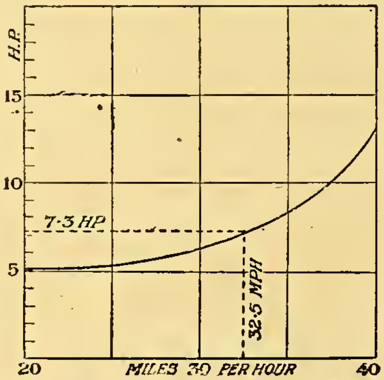
From Table I. it will be seen that the highest r.p.m. of the engine in question are about 2,800.

$$\text{I.H.P. developed at this speed} = \frac{30.5 \times 2{,}800}{9{,}900}$$
$$= 8.6$$

H.P. available at road wheel = 7.3

We have now to find the m.p.h. such that the h.p. absorbed by wind resistance at that speed, *added* to the h.p. absorbed by gradient at that speed, exactly equals the h.p. 7.3 available. This may be most conveniently done by means of a graph. To draw this three calculations must be made:

H.P. absorbed by air resistance plus h.p. absorbed by gradient at 20 m.p.h., 30 m.p.h., and 40 m.p.h.



Graph indicating the h.p. expended in overcoming wind resistance through a range of speed from 20 to 40 m.p.h.

The methods of obtaining these have been shown, so that results only are given here, the figures being 5.09 h.p., 6.42 h.p., and 12.56 h.p. respectively. Plot these as shown, and where the 7.3 h.p. line cuts the curve read off the required speed = 32.5 m.p.h.

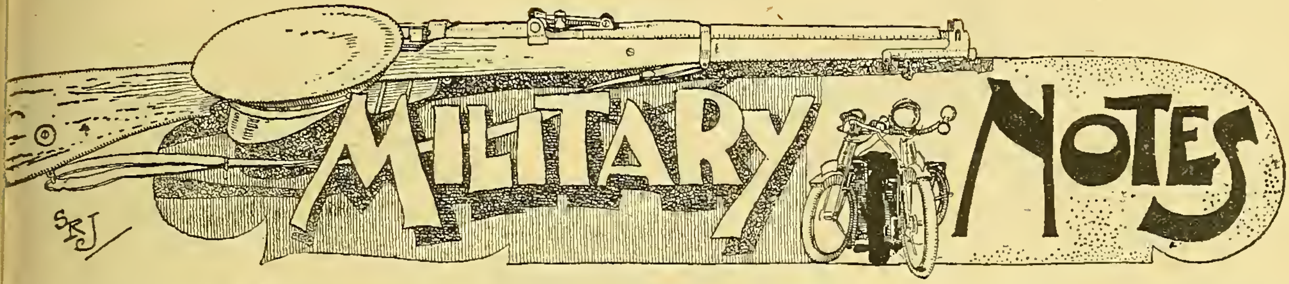
Gear necessary engine revs. 2,800 at 32 m.p.h. = 6.6 to 1.

ENGRO.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.



CAPTAIN R.F.C.

WE recently met S. R. Axford, who is now a captain in the R.F.C., and employed at home. He was a frequent competitor at Brooklands prior to the war, and when hostilities began he joined the R.N.A.S.

TANKS AND "TANKS."

THE following somewhat curious letter has been received by Mr. A. Green, manufacturer of petrol tanks, oil tanks, etc., of Water Street, Blackfriars, Salford, Manchester:

"I have just happened to see an announcement inserted by you in *The Motor Cycle* dated December 13th, 1917, referring to the repair of tanks of every description. We have quite a small number of Tanks which have been in this recent assault, and are left in our care for repair, so if you will kindly endeavour to partake of some of the work we would be humbly grateful to you. Perhaps you have seen the monstrous looking object as it was in your city a few weeks ago, and, if so, you will have some idea of the work attached to it. My address is as follows: Gunner J. Stamp, 94901, No. 2 Tank Field Company, Tank Corps, B.E.F., France. Kindly send reply, and we will send them on by parcel post."

To this letter Mr. Green has replied in the following terms:

"We are in receipt of your favour dated the 25th inst., for which we are very much obliged. The writer of this is just a little too old to help you to take part in the repair of the few Tanks just damaged in a recent assault over there. We suggest you go on killing Huns for a little more. When you have finished with the Huns, and if you will be good enough to let us know how many dozen of the Tanks you have that require our attention, we shall be pleased to send you a small case to pack them in and forward to us by parcel post. The letter has been very cheerful reading to us, seeing that the hardship you poor Byng b-hoys have to put up with, and yet you are always merry and bright. May your troubles be little ones. It may interest you to know that we have forwarded your letter to the editor of *The Motor Cycle*. We hope this will be given publicity to show the public at home the bright side of your struggle. Wishing you the best of luck and a speedy return."

NEWS OF AN A.C.U. OFFICIAL NOW SERVING.

WE have received the following letter from Pte. F. J. Briggs, who is a motor cyclist attached to a Field Ambulance in France. Before the war Briggs was assistant clerk to the Auto Cycle Union, and did much good work for, and took great interest in, the various competitions which the Auto Cycle Union then held. He writes: "I am fortunate enough to be riding a Triumph motor cycle at present, and must say that the roads near this portion of the line are exceptionally good, which makes riding a pleasure. The copy of *The Motor Cycle* which I receive weekly is perused with interest by several men in this unit, most of whom have not yet ridden a motor cycle but hope to take up motor cycling as a pastime *après la guerre*. Have you heard from Mr. Beasley (formerly assistant secretary of the A.C.U.) lately? I received a letter from him just before Christmas, and was sorry to learn that he had been suffering from rheumatic fever. I eagerly await the post-war reliability trials, as I firmly believe that the riding experience gained on Active Service will tend to make competition even more keen than it was in pre-war days. The English roads will be 'child's play' to men who have for the past three years ridden over *pavé* and through the awful mud of the Somme in November and December, 1916."

WHO IS THE OLDEST D.R.?

FROM Robt. Harvey we have received the following letter, and we should imagine it will be difficult to find a better record when age is considered:

Sgt. Robt. Harvey.

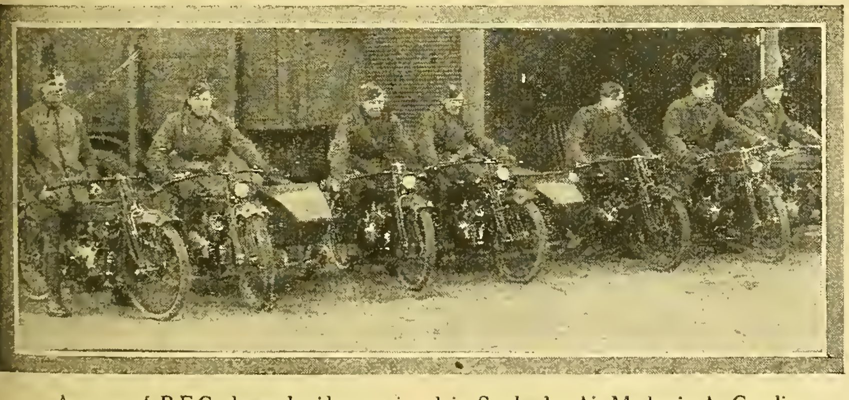
"The enclosed portion of *The Motor Cycle* has been handed to me by a D.R., who thinks I must be the oldest D.R. and suggests that I write to you.

"My age is 49½. I signed on on August 5th, 1914, and was called up on October 22nd, 1914. Since then I have served without a break, making three years and three months. Out of that I spent fourteen months in France. I was with the 38th Division on the Ypres Front, and came back to England on September 25th last.

"I left the 25th Battalion City of London Regiment at the latter end of 1910, after having served for twenty-four years in the Regulars, Volunteers, and Territorials. My age was 46 when I re-enlisted."

FLYING IN A DERELICT AEROPLANE.

LT. BERTIE C. R. GROOMWOOD, R.F.A. and R.F.C. (M.C.), was severely wounded in the air by a shell which destroyed his wireless apparatus. His machine was so badly damaged that no expert would have believed it could hold together in the air, but, in spite of this and of his wounds, he wrote out a message reporting the position of the enemy, and dropped it on D.H.Q., who were able to put nine batteries on to the target.


A group of R.F.C. despatch riders stationed in Scotland. Air-Mechanic A. Cuvelier (third from left), who sends the photograph, says they have had the "worst weather in the Isles," but the machines (P. and M.'s) never failed.

CURRENT CHAT

Time to Light Lamps

Greenwich Time.

Feb. 14th	... ...	5.40 p.m.
,, 16th	... ...	5.43 ,,
,, 18th	... ...	5.47 ,,
,, 20th	... ...	5.51 ,,

National War Funds.

The National Relief Fund (distributed £3,783,657)	£6,330,736	0	0
British Red Cross	9,063,444	17	11½
Tobacco Fund	148,242	0	0

Present of a Car to a Hospital.

A motor car has been presented to the Great Northern Central Hospital, for the transport of patients.

Good Work and Funds.

This hospital, situated in Holloway, is the largest medical charity in North London, has a very wide London area to serve, as well as being open for patients from any part of the country, and is urgently in need of funds. We have no hesitation in asking readers to help this institution

The Motor Transport Volunteers.

The headquarters of the Motor Volunteers, that excellent body which transports troops on leave by motor car, motor lorry, and motor cycle in the dead of night, when the tubes have stopped running, from one London terminus to another, have recently been changed to 225, Oxford Street, W. They are in urgent need of recruits who are drivers of motor cycles, or who are willing to avail themselves of free tuition in the driving of motor lorries. The only expenses involved in joining the corps consist of the annual subscription of one guinea and the cost of the uniform.

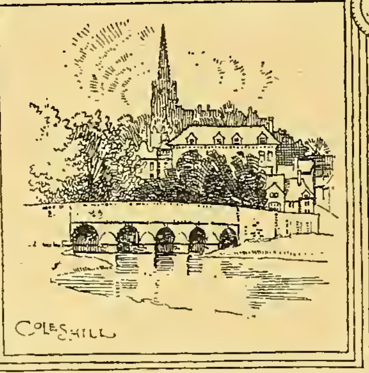
The call upon one's time is not excessive, as the minimum attendance required is one night a week, and those who are deprived of the pleasures of motoring in the ordinary way may be glad to have the opportunity of still continuing to drive, and at the same time of doing useful service for their country.

A New Use for Motor Cycles.

Motor cycles are used in the sunbathed country of South California by men who patrol the orange and lemon districts to protect them against injury from frost. The growers use crude oil burning heaters to warm up the fruit in their groves when the temperature drops to 30° or less during the winter nights, and in order to know when to begin lighting the heaters the growers maintain a squad of motor cyclists to read the thermometers for them.

Covering Twelve Square Miles Every Hour

There are 136 Government thermometers located on telephone poles, trees, and posts, at the roadside in all the lower portions of the valley, and seven motor cycle patrol men, each having about twelve square miles to cover every hour, are deputed to watch some fifteen or twenty thermometers and register their temperatures on a card, and report if there is any tendency towards frost. The motor cycle riders are therefore to a great extent responsible for the safety of the fruit crops, worth nearly 5,000,000 dollars a year.



Artificial Limbs.

Five more centres for the repair and renewal of the artificial limbs of soldiers are to be opened shortly.

The Canadian R.F.C.

Members of the Canadian Royal Flying Corps in Toronto are proving themselves to be enthusiastic riders of motor cycles in winter, as they use no fewer than fifty motor bicycles and sidecars, which are in daily use, in spite of deep snow and furious storms. In that part of the world they are setting the fashion as regards winter riding costumes. With brown leather jackets, helmets, leggings, and fur-trimmed goggles they present a striking appearance. The military riders, we learn, are proving the value of the motor cycle for winter work. They go everywhere and through everything without a hitch, and have opened the eyes of a number of people to the utility of the motor cycle.

Pte P. L. Bassett, M.T.,A.S.C., taken a prisoner at Cambrai. He was a member of the Doncaster Motor Cycle Club, and a frequent competitor in the trials of that district.

Special Features

A GLOSSARY OF FLYING TERMS.
BRITISH AND AMERICAN MACHINES.
SKETCHES IN PRE-WAR FRANCE.

President of Wolverhampton Motor Cycle Club and War Bonds.

When the Tank was at Wolverhampton last week, Mr. Alfred Bird, M.P., president of the Wolverhampton Motor Cycle Club, took up £30,000 of War Bonds.

Big Figures.

In these days of big figures it may be interesting to learn that the fall of rain for 1917 in the United Kingdom was 2% less than usual. This 2% represents 7,000,000,000 tons.

An Ex-King and his Petrol.

Rumour has it that trouble is afoot in Zurich because Tino, late of Greece, has fourteen cars which he can keep in continuous service, although other residents of Zurich have no petrol at all for use in their cars.

The Question of Reinstatement.

The National Alliance of Employers and Employed last week discussed the question of the reinstatement of men serving with the Forces. A constructive scheme will be placed before the Government.

Coventry Branch of the I.A.E.

The Graduates' Section (Coventry Branch) of the Institution of Automobile Engineers are having a paper read to them by Mr. A. G. Perdrell on "Motor Cycles" next Tuesday (the 19th inst.) at the King's Head Hotel, Coventry. The chair will be taken at 7.45 p.m. by Mr. W. J. Tennant.

The Tank at Coventry.

On Monday last the travelling Tank made its appearance in Coventry, to the accompaniment of a brass band. Peculiar interest is attached to the event, inasmuch as the first men for the Motor Machine Gun Section were recruited in Coventry by *The Motor Cycle*, and it was from this section that the crews for the first Tanks were obtained.

The Motor Cycle and the Missionary.

Motor cycles are used by missionaries in various outlandish parts of the world. One of our most faithful readers was an American missionary who worked for many years in Southern India, and was a keen Triumph enthusiast.

We have lately heard of a missionary who has been using a Harley-Davidson in Korea, and he reports that numerous fellow-missionaries are using similar machines. He is now using a three-speed Powerplus Indian. He writes: "The motor cycle has come among us to take its place with us in serving the poor heathen in this wild part of the globe."

ails Lost at Sea.

The Postmaster-General announces the ss at sea through enemy action of parcel ails for Malta (Civil Post Office, Fleet, d hospitals), containing parcels posted ring the month of December; and also mails from the Egyptian Expedi- onary Force containing letters posted etween January 21st and 26th approxi- ately.

eronautical Training.

The Motor Training Institute, Ltd., 10, eddon Street, Regent Street, London, .1—a motor school appointed by the oyal Automobile Club—is now prepared give courses of lessons in aeronautical struction. Doubtless numerous readers *The Motor Cycle* who are taking an terest in aviation will be glad to have articulars, which will be sent to them application by the Motor Training stitute, Ltd.

ngineers and Oil.

At a meeting of the National Motor yclists' Fuel Union on February 4th, the Imperial Hotel, Birmingham, the ollowing resolution was unanimously dopted: "That this representative meet- g, comprising delegate members of the ational Motor Cyclists' Fuel Union, nd consisting of engineers who are fore- en, shop stewards, and leading hands aero engine, motor shipbuilding, and ther engineering factories engaged on ar work, pledges itself to do all pos- ible by personal effort to economise in e consumption of petrol, paraffin, bricating oils, grease, and other im- orted petroleum products, in order that ore shipping space may be available bring food into the country, and the uel provided to distribute it by road otors."

Motor Transport Volunteers.

Owing to the growth of the work of the Motor Transport Volunteers, who convey leave troops across London, larger headquarters have been secured, and are now in use, at 225, Oxford Street, W.1.

The Engineering Standards Committee.

In the article on standardisation in the *Board of Trade Journal* for February 7th, to which reference is made elsewhere in this issue, there are several complimentary remarks made to the Engineering Standards Committee.

Petrol on Irish Coast.

An Irish correspondent asks us—apparently in all seriousness—whether we recommend him to use petrol or paraffin for running his motor cycle. Petrol is available at 1s. 6d.-3s. a gallon, and is continually being washed up on the shore, but paraffin, he says, comes out on an average somewhat cheaper!

Petrol for Soldiers.

There appeared in the issue of January 31st a letter regarding the granting of petrol permits to men of H.M. Forces while on leave or convalescent. This dealt with the case of an applicant who, though he did not own a motor bicycle himself, was joint owner of one with his brother, and so was unable to get a permit granted to him because the regulations stipulate that the applicant must be the registered owner of a motor vehicle. The matter has been brought before the Petrol Controller's Department, and we are informed that licences will now be granted to a member of H.M. Forces while on short leave from the fronts, or convalescent, provided there is a motor vehicle available for them owned by a member of the household or by a very near relative.

"The Motor Cycle" Roll of Honour.

At the present date *The Motor Cycle* Roll of Honour stands as follows:

Sec.-Lt. Geoffrey Smith (Editor). Equipment Officer, R.F.C.; Engine Department, Air Board.

Capt. H. D. Teage. Equipment Officer, R.F.C.; engaged in technical work, and retained at Farnborough.

Lt. Maurice Sampson (afterwards Editor of *The Light Car*). R.F.C.; in charge of group of aeroplane manufacturers.

Sec.-Lt. B. Alan Hill. R.F.C.; served with the British Red Cross, was discharged; later took up a commission as Equipment Officer, R.F.C.; holder of Mons Medal.

Sec.-Lt. N. C. Barnes. R.A.; at the outbreak of war was a member of the Warwickshire Yeomanry.

C. F. Hayward. R.N.A.S.; served with Service de Santé Militaire (French Red Cross).

Pte. S. A. M. Witham. A.S.C.; quartered at base in France; served as despatch rider and was wounded.

Cpl. T. W. Parker. A.S.C., M.T., serving with Egyptian Expeditionary Force.

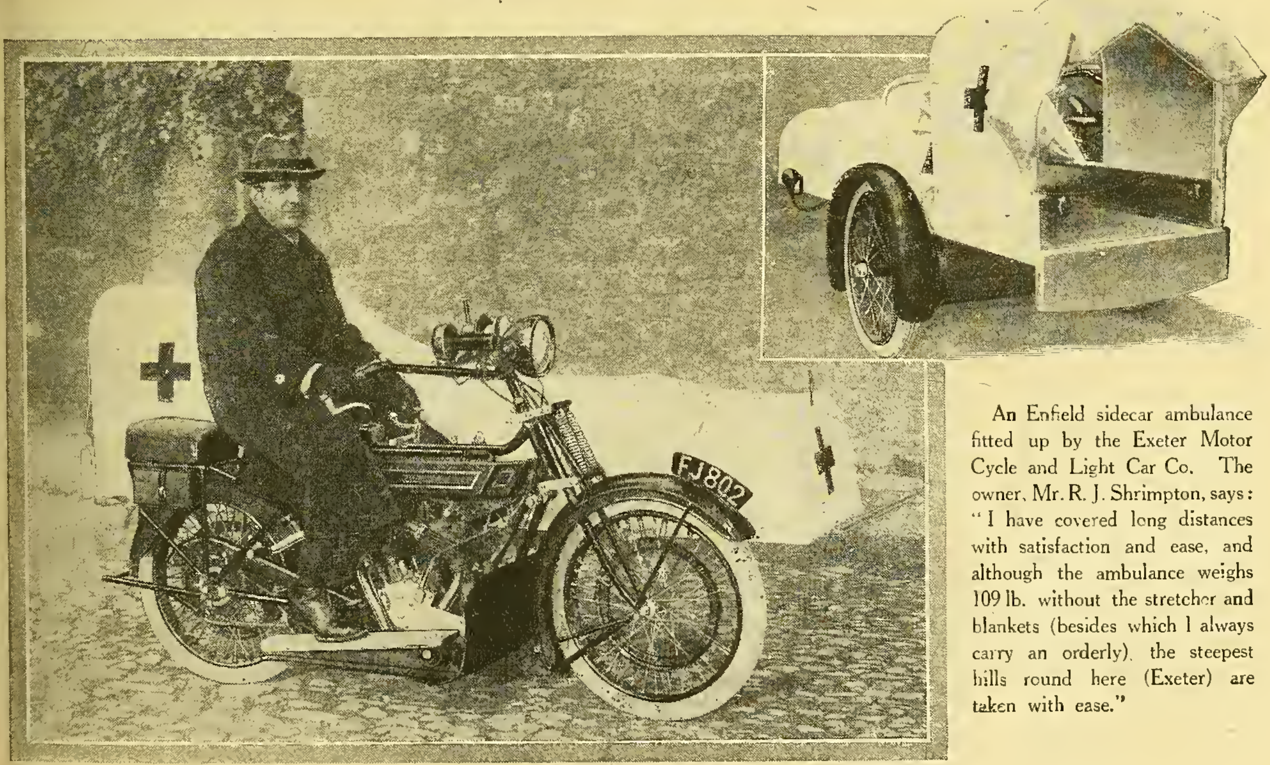
Gnr. G. Beresford. Wounded in France.

H. M. Batten. Service de Santé Militaire (French Red Cross).

All the above are of the Editorial Staff.

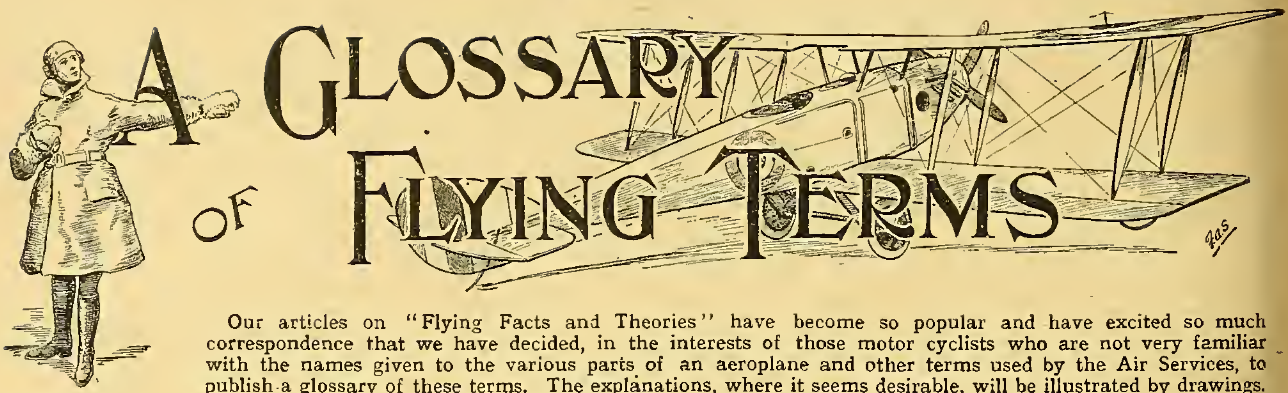
Capt. H. B. Elliot (Advertising Staff): Tanks Corps.

Maj. A. J. Palmer (Assistant Cashier). Tanks Corps; joined the Motor Machine Gun Corps in 1914.



An Enfield sidecar ambulance fitted up by the Exeter Motor Cycle and Light Car Co. The owner, Mr. R. J. Shrimpton, says: "I have covered long distances with satisfaction and ease, and although the ambulance weighs 109 lb. without the stretcher and blankets (besides which I always carry an orderly), the steepest hills round here (Exeter) are taken with ease."

A GLOSSARY OF FLYING TERMS



Our articles on "Flying Facts and Theories" have become so popular and have excited so much correspondence that we have decided, in the interests of those motor cyclists who are not very familiar with the names given to the various parts of an aeroplane and other terms used by the Air Services, to publish a glossary of these terms. The explanations, where it seems desirable, will be illustrated by drawings.

AERODROME.

Often abbreviated into "'drome": literally means a flying machine or "aerial runner." Is applied to a flying ground, sometimes to indicate the open starting and landing space in the centre, sometimes to cover the hangars, workshops, offices, etc., as well.

AERODYNAMICS.

Literally, the study of aerial forces: the science of mechanical flight, but with special reference to utilising the air for lift and motion.

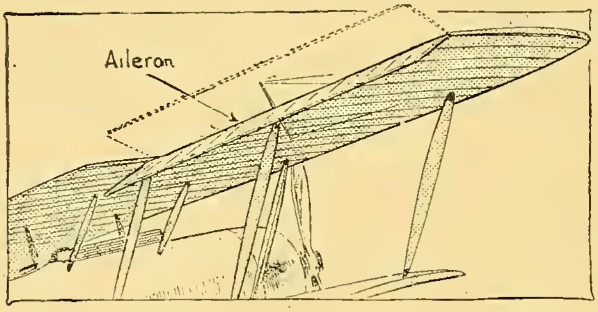


Fig. 1.

AEROFOIL.

Literally, "air leaf." A pedantic term, seldom used except in highly technical works, for the lifting or controlling surfaces of an aeroplane. It implies a curved surface of considerable area, but no great thickness (see fig. 1).

AERONAUTICS.

Literally, the study of sailing in the air: the science of aerial navigation. Aeronautics thus includes such subjects as steering a course in flight and the perfection of compasses, which do not properly come under aerodynamics.

AEROPLANE.

A heavier-than-air flying machine; literally, an "air-surface."

AEROSTAT.

A lighter-than-air flying machine: an airship: a gasbag.

AILERON.

The hinged flaps fitted to the rear edges of the wing-tips of most aeroplanes for purposes of lateral control—*i.e.*, of banking the machine for a turn, of making it sideslip, and of keeping it on a level keel (fig. 1).

AIR POCKET.

Otherwise called a remou, or more commonly described by its effects and simply called a "bump." Patches of rarefied air and downward wind currents may cause a machine to "bump," or suddenly lose altitude whilst flying. Such a "bump" may affect the entire machine, or one wing only: an upward current under one wing will feel just the same as a downward current above the other wing. It is not possible for the pilot to distinguish between these phenomena, except by deduction from the natural objects which cause them; for example, when a machine crosses the coastline on a hot day, hot air will radiate from the sandy beach much faster than from the sea. A pilot flying out to sea at right angles to the beach would "bump" out of the fast upward current from the sand, down into the slow upward current from the water, and might speak (inaccurately) of having fallen into an "air pocket." A pilot flying along the coastline might get one wing of his machine into the air rising off quickly from the sand, and the other wing into air rising slowly from the water: he would then get a sideway bump towards the sea, etc.

AIR SCREW.

The correct general term for the propellers of both tractor and pusher machine (*q.v.*), only used by pedants and in technical works. In the Services the abbreviation "prop." is invariably used for both types of air screw, though, strictly speaking, a propeller is the air screw of a pusher machine.

ALTIMETER.

An instrument employed for measuring height. A common type takes the form of a flexible vacuum box, the lid of which responds to the varying pressure of the atmosphere at different altitudes. The movements of the lid are magnified by a system of linked levers, which operate a needle swinging over a dial calibrated in hundreds and thousands of feet.

ANGLE OF INCIDENCE.

Before the significance of the angle of "incidence," or of "attack," as it is sometimes called, can be grasped, it is necessary to understand how an aeroplane obtains lifting power from its planes. If a sheet of notepaper be held in the face of a mild breeze, three different positions are of interest (fig. 2):

(A) Horizontal, with its surface parallel to the breeze. If it is held exactly in this position, the breeze will not affect the paper visibly. The thin edge of the paper will not offer any perceptible resistance to the wind: in flight parlance, it will not cause any "drift." Neither will the paper tend to rise into the air, for the breeze is not directed against its under surface, and so cannot impart any "lift" to the paper.

(B) Vertical, with its surface at right angles to the wind. In this position, the wind will tend to blow the paper straight backwards, or even to tear it in half, if it is strongly held. The paper is now offering the maximum resistance or "drift." It has no tendency to "lift" or flutter upwards, because there is no upward pressure on any part of its surface.

(C) Tilted towards the wind, with its front edge above the rear edge. In this position the paper tends to rise in a back-

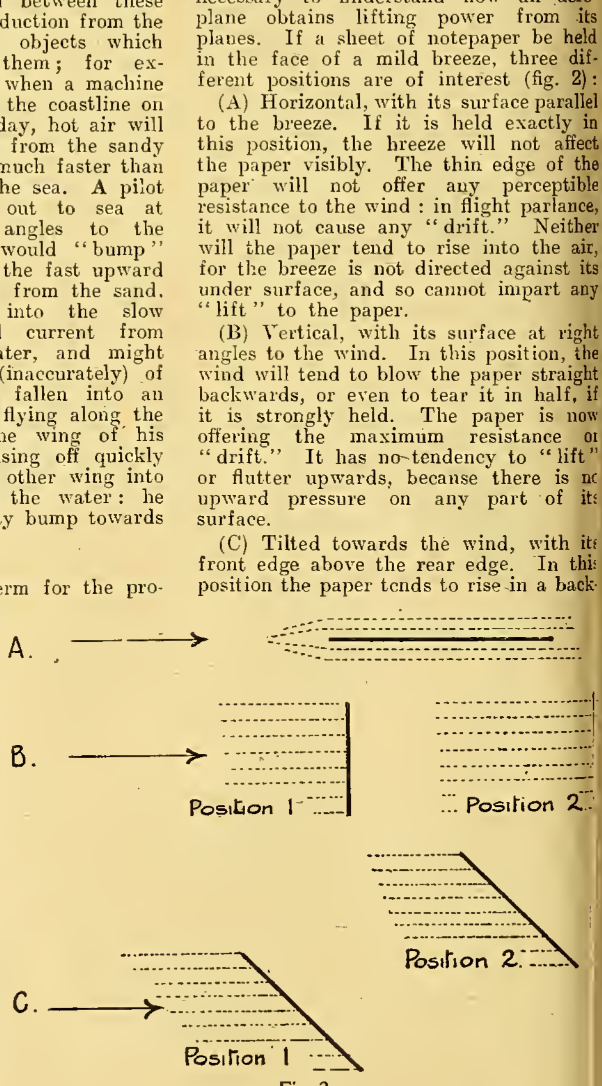


Fig 2.

A Glossary of Flying Terms —

ward direction. The breeze is striking ts under surface, and so imparts "lift": at the same time the paper is offering resistance to the progress of the wind.

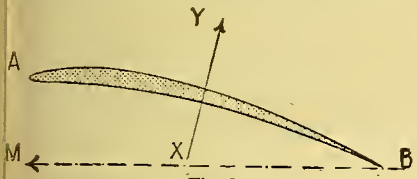


Fig. 3.

Positions A and B are not used in flying, even with the curved or cambered surfaces employed on aeroplanes. The lifting and controlling surfaces are always driven into the air at an inclined angle, as in C: and this angle is the angle of attack or incidence, which can now receive closer definition.

By Newton's law of motion, an equal and opposite reaction is opposed to every action. Thus, if we drive the aerofoil or surface AB in fig. 3 through the air in the direction shown, we provoke an equal and opposite reaction. It is this reaction on which we depend for flight, and its direction is indicated by the line XY. The above experiments with a piece of notepaper show that this "reaction" is the combined result of two different forces, or of forces acting in two different directions: the paper, when held stationary against the wind in position C, fig. 2, tended

(i.) To rise or "lift"; and
(ii.) To blow backwards or "drift."

When the curved surfaces of an aeroplane are thrust against a mass of air at, say, 100 m.p.h. by a powerful engine operating a propeller, these two forces, or two "components of the reaction," are brought into play. They are shown in fig. 4 with their respective directions. "Lift," the vertical part of the reaction, operates vertically; "drift," the horizontal part of the reaction, operates horizontally. Lift tends to raise the aeroplane off the ground; drift tends to blow the aeroplane backwards. No matter at what angle between 0° and 90° we drive the plane AB, we shall provoke a reaction, consisting partly of "lift" and partly of "drift." If AB were flat and had no thickness, there would be no reaction at all at an angle of incidence of 0°: and at 90° the reaction would consist wholly of "drift." As AB happens to be curved, it is less easy to discover the angles at which it is absolutely ineffective for flying purposes. Nevertheless, the experiments with a sheet of notepaper will show that the "drift" is less with the paper nearly horizontal, or at a small "angle of incidence," and that the "lift" is best when the paper is tilted backwards rather steeply. This is very annoying, as the designing of an efficient aeroplane clearly depends on our securing the maximum of lift and the minimum of drift: a high angle gives one, and a small angle gives the other. Our plane can only be set at one fixed angle, until somebody invents planes which can be adjusted by the pilot whilst he is flying. So we shall have to compromise and select an angle for our plane which gives a good ratio of lift to drift.

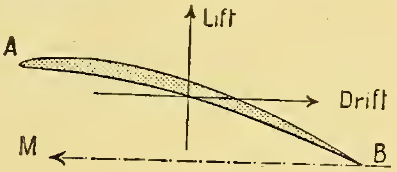


Fig. 4.

We shall wish to talk over our angle of incidence with other designers, so we must settle upon a standard way of measuring it. Every schoolboy knows you draw an angle by inclining two straight lines towards each other, and measure the arc between them with a protractor. The direction of motion will do very nicely for the base line of our angle, but the plane itself is a curved line: how can we find the top line by which to draw a measurable angle? For rule of thumb work in hangars, where this angle has to be adjusted by setting the bracing wires, we can draw a string from the front edge of the plane to the rear edge (this line is the "chord" of a plane), or lay a straight-edge along the chord. This is not quite accurate enough for a scientist. Some planes are so curiously shaped that they will fly when the chord comes below the direction of motion, instead of above it, so giving what is called a "negative" angle of incidence.

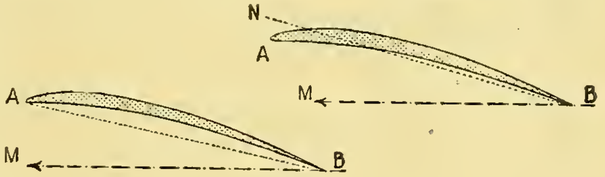


Fig. 5.

The scientist measures the angle of incidence between the direction of motion as the base line, and the "neutral lift line" as his upper line. The neutral lift line can only be calculated: it cannot be found in any given plane by rule of thumb. This is what it is. If the plane AB is lowered down towards the line M—the direction of motion—it must eventually be so flattened out that it will give no lift, and cannot fly. When the position in which it ceases to lift is found, draw a horizontal line through the plane from the trailing or rear edge B. This line is the neutral lift line. When the plane AB is mounted on an aeroplane, its angle of incidence is the angle between the direction of motion and the neutral lift line. Thus in fig. 5 the angle ABM is the riggers' angle of incidence, used in the hangars; and the angle MBN is the designer's angle of incidence, used in the laboratory, the wind tunnel, and the drawing office.

In the hangar, the riggers set the angle of incidence by the makers' instructions, which may take some such form as this. The aeroplane is propped up until a spirit level placed on the engine bearers centres its bubble precisely. A long straight-edge is then placed under each plane in turn, with its rear tip touching a stated part of the plane—*e.g.*, the centre of the rear spar. This straight-edge is levelled horizontally with a spirit level. The distance from the front edge of the plane to the straight-edge is measured in inches by a plumb-line, and must be set to, say, 6in.

A designer arranges for a certain angle of incidence, which the planes will assume in the position of horizontal flight. The pilot varies this angle in flight by the use of his elevators. For example, the angle for horizontal flight may be 3° or 4°; in climbing, the elevators will increase the angle to 7° or 8°; when the pilot deliberately "stalls" the machine to make a landing, the angle may reach 15°.

* * *

STANDARDISATION.

IS IT REALLY COMING AT LAST?

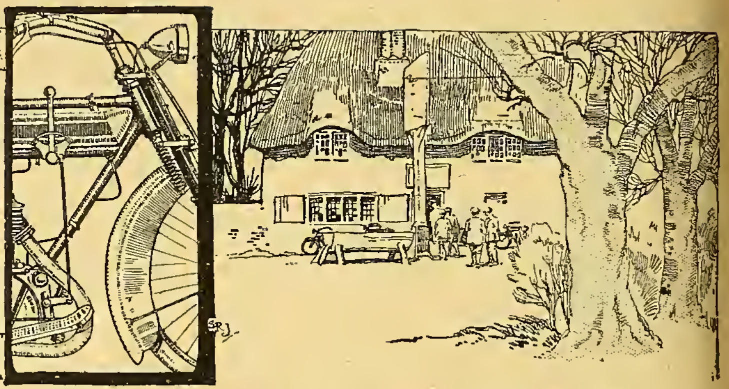
THE *Board of Trade Journal* for February 7th contains some lengthy and interesting remarks on the absorbing topic of standardisation. The way in which certain sections of the community are awaking to the full significance and possibilities of standardisation is almost amusing as well as eminently gratifying. In this issue of the *Journal* the question is dealt with as it concerns ships and marine engines, locomotives, machine tools, electrical trades, iron and steel trades, and the textile industries.

It is pointed out that America especially has benefited from this development of standardisation wherever possible, and as a specific instance is quoted the American capture of a large share of the machine tool trade, especially in milling and grinding machines and automatic lathes, as a result of carefully standardised manufacturing methods.

It is interesting to note that Swiss watches are coupled with American motors, agricultural implements, typewriters, and telephone appliances as further examples of what has been done by the adoption of standardisation methods.

It is clearly pointed out in the article that foreign competitors have only attained their high degree of standardisation by close co-operation between the various manufacturers in specified trades, and that if our manufacturers wish to compete with the foreigner they must first decide on a scheme of close co-operation amongst themselves. There is no harm in repeating once again that the key to the whole situation is quantity production on as large a scale as possible.

AMERICAN AND BRITISH MOTOR CYCLES



A Criticism of "Chinook's" Article, and a Defence of American Practice.

I SHOULD like to try and answer "Chinook's" drastic article on American and British machines, although I do not claim to be a writer, but it would not be right to let such statements pass without disputing them to some extent, and to me it appears, with all due respect to "Chinook" as a writer and rider, that he has not had a very wide experience of American machines, either on the road or at the bench.

I am rather surprised that "Chinook" should write in such, shall I call it sarcastic, manner, and shall I add that I think he would change some of his views and arguments were he to be less biassed and get more hard experience, because experience does teach? First, I ought to explain that I have had sixteen years in *the* trade (not kindred trades), and may be classed, I think, as an enthusiast. This period covers berths as charge hand in large garage, proprietor of large motor cycle business, building the much-run-down "local-made" machine, with a fair sprinkling of racing and competition work. This is not mentioned out of any spirit of boastfulness, but just to show that I have a knowledge of British machines of all types, makes, and powers. During this time my own machines have been many, and to-day I have a Norton, Rudge, and two 1,100 c.c. American twins of well-known make, and it is from experience with these many and varied makes that I base my opinions. Moreover, bench work on the best English and American practice is very interesting, and greatly helps one to make comparisons.

Accessibility.

"Chinook" makes a very one-sided claim when he compares a 500 c.c. flat twin with a big V twin of any country's origin, and, in fairness to all concerned, the best and most representative makes of both countries under discussion ought to be used, and not a star up-to-date masterpiece of our Homeland against, perhaps, some little known and perhaps out-of-date production from across the pond. Some of our lesser-known makes over here will not stand much limelight and criticism (does "Chinook" know of a *British* flat twin where, if the magneto has to be taken off, the engine complete must be removed? I do only too well); and I will undertake any time to take off the magneto of either of my American twins whilst he performs the same operation on the British flat twin. We must also bear in mind that, after all, the accessibility of the magneto is not of such vital importance; by that I mean there are far more vulnerable points on a machine which require attention oftener than the very reliable type of magneto which we are favoured with to-day. In pointing out some of these vulnerable points, I shall try to show that in many cases they receive more and better attention from the American manufacturer than the majority of our home producers.

As a set off to "Chinook's" struggle, covering *two* hours, may I ask him if ever he has tried to remove a sprocket, fixed in the orthodox English manner, *i.e.*, screwed, after it has done a season under power, and then the American type, where the sprocket can usually be pulled off the splinings of the hub or sleeve-shaft after simply undoing a lock ring? That is, of course, only one small detail, but an important one in accessibility.

Cleaning the Engine.

As to engines, well, personally, when used to it, I would far rather remove the engine bodily from the frame to clean it out, or have detachable heads, than struggle on the floor with the usual type of English big twin, and I can complete the operation more quickly. Perhaps, however, this is a matter of opinion, so we will leave it at that. There are also many other little points which compare very favourably with the flat twin instance, and I should like to show "Chinook" that against his two hours' struggle I will give him the magneto from either of my machines in less than a quarter of an hour, and that is as good as, and better than, perhaps some English twins—flat and V—of which I happen to know. Compare the Rudge single-cylinder magneto drive with strap fixing, ensuring very quick and easy detachability, and then note how this firm had to depart from its standard and come to the common method of chain drive, with the usual magneto position and fixing on its 1,000 c.c. twin, again proving, after all, that there are not a great number of different ways of doing this job. The writer, in the 1910 T.T. race, rode a machine he designed and built, in which the magneto was detachable in thirty seconds, but it did not stand a rider in any good stead, simply because it was not by any means an every day occurrence to take off the magneto, so I think that "Chinook's" ideas of comparing such points as these to run down a machine are very shallow, and ought to have been left out.

Engine Balance.

Then I come to engine balance, periods, and smooth running. I think "Chinook's" own confession that the Americans turn out a far smoother running and silent engine, and have beaten us on this point, is sufficient answer to his own criticism, when we reckon that firms who will pay much attention to other details will not make sure that their engines are as well balanced as possible. If he will closely examine the construction of one of these well-known power units he will see that things have been thought out in such a long and level-headed manner that the bad balance and most "appalling period" which are so obvious in many English engines to-day are non-existent as far as mechanical design can make them; and it does not need a very brilliant engineer to see this. My personal experience at the bench confirms my opinion that the average American engine, inside and outside, is as good an engineering proposition as any of ours, and my road tests have never shown me that their engines suffer from a period, or lack of durability.

What, I ask, is the matter with *any* American machine which is *selling* in this country? One seldom sees an American machine running other than smoothly, silently, and silkily, without that shake-to-pieces-in-neutral style so common on most of our machines, due perhaps in a large measure to poo carburetters, combined with many othe factors in design, some so very plain t see in many (too many, alas!) Englis engines. I notice that "Chinook" neve mentions such things—details to him perhaps, but boons to hundreds of riders as mechanical lubrication and air release automatic carburation, splendid an durable design of all engine details bearings, pistons, and general interna parts, timing gears (usually no rattle) valve ports, pipe fixings, and othe details too numerous to mention.

Fittings.

Then he refers to "fittings and fittings. Amongst these he classes the brake—tha all important fitting—which he admits usually a good job, and works well, so think his reference to holding togethe until permanently rusted to the fram may be crossed off as simply too ridiculo to answer. Statements like these mu

American and British Motor Cycles.—

undoubtedly lead a certain class of the British public to sympathise with us poor mortals who have unfortunately been saddled with what he would have us believe are glorified scrapheaps in return for our hard-earned coin.

To his reference about twist grip control and the three positions it gives—full, half, and shut—I am sure he must either be trying to be sarcastic or else he has never really had much experience with a movement which, personally, I prefer to all tap-twiddling, and I think this would be better answered by riders who have changed from one to the other; they surely will give an unbiassed opinion. I know which I like best; but, of course, I had to try it to be convinced, and now I am tap "twiddling" all the day—it is my bread and butter.

Split Pins.

Where he finds his sixty split pins I am at a loss to know; but, after all, are they such a tremendous disadvantage as he says, and would not some English machines (with a period) already fitted with pins do better with a few more round about? Both my machines together cannot total sixty pins; the nuts, studs, and pins are a good job. We might also make comparisons in frame design and construction, and we must remember that the Americans have had successful spring frames for a good few years now, and have left off the use of castings for lugs (a big cause of trouble in a 550 c.c. well-known W.D. single) and used stampings and pressings whenever possible, and have discarded the usual common type of push cycle handle-bars and fixings by clip and bolt, which we still strongly adhere to. Fork design and lubrication of moving parts by sensible oilers have been features for years.

Other Points of Design.

Then tanks and tank fixing, gear boxes and heavy duty gears, clutch design and methods of operating, interlocking of gears and dual control, good methods of engine fixing, large wheels and tyres, big ground clearance, sensible design of hubs and spindles, and other points of general completeness, show attention to details which leave "lawn mower and agricultural machinery," and many British motor cycle designs, far behind.

I will not go into any really vile faults of some British designs, but amongst others does "Chinook" know of a "Big Four" where it is necessary to drive out the gudgeon pin, after slightly lifting the cylinder ere the cylinder can be removed; also an English twin and sidecar where the gear case and chain cover cannot be removed until the sidecar is detached owing to one of the arms fouling; some machines where there is great difficulty in getting the rear wheel out without taking off the back stand, and in some cases the guard; a well-known sidecar "Six" where it is practically impossible to remove the driving sprocket from the gear sleeve shaft by any ordinary methods; and the English engine where the small timing pinion is screwed on the crankshaft without any provision for removal outside the works—these instances being only a few random ones found on some of our best-known makes.

One never sees the Americans fit the obsolete type of front rim brake or so much cable work to the rear brakes. And has "Chinook" ever seen the same average number of frame breakages and fractures that are so noticeable on some of our frames—this in spite of his reference to drilling back stays, etc.?

No, I do not think "Chinook" has been broad-minded enough in his criticisms, and some of his faults and statements are, I am sure it will be admitted, in many cases imaginary. I am not out to pull the English machine to pieces unmercifully, but I do maintain that we could with advantage take a few tips and improve our machines to compete with the world.

Advice to British Makers.

One has only to follow up some of the Overseas letters in *The Motor Cycle* at times to find that my ideas are to a certain extent fairly general in the Colonies. Design and methods of service—*i.e.*, treatment of customers and supply of parts which *do* fit—go a long way to assure the Americans a big prestige for many years to come, unless we are very quick to grasp facts, and do not argue with each other in a poor sarcastic way over obvious things whilst Uncle Sam is taking our trade. This prestige will never be attained whilst we take such narrow-minded views and talk as though all foreign machines were old iron.

I should like to see some enterprising British manufacturer embody a few of the American ideas, and then we should certainly see which way the wind blows, for the public are the best indicators of that, after all. Like "Chinook," I, too, am an Englishman, at present in khaki, and still on a motor cycle job, and I could add a bit more on W.D. machines, but "nuff sed." I am sticking to my Yanks until——? and when we do get the enterprise (and competition *will* be keen after the war), then I shall certainly come back to a British machine. Of course I admit that our singles beat easily the American efforts in this line, and my Rudge and Norton leave me satisfied in that respect. But because British manufacturers have specialised in the single we must not forget there is such a thing as a twin, and twins are mainly our present concern.

Summary.

I hope some riders—not the type referred to as resorting to paper experience, but practical road men with average mechanical riding ability—may see fit to express their opinions in your pages. In conclusion, we must not forget that the Americans work against a $33\frac{1}{3}\%$ disadvantage in this country, and if that were removed (I am not entering into politics), we should (to use army parlance) have to "put a jerk in it" to mark time with our friends and Allies across the pond.

Of course, be it noted, I do not make such sweeping statements against the typical British machines; we are well in the running, and turn out some fine productions (also otherwise), yet I maintain that our best would be improved by the addition of a few points from America, in the same way that theirs would be improved by some of our ideas. Yet again I add that "Chinook" was far too hard and biassed. Competition, all will admit, helps to improve the breed, and I long to see that improvement come, and put it forward as my excuse for my poor efforts as a writer. In the meantime I am a satisfied rider of American machines, and shall remain so until such times as I have mentioned, and then I shall be glad to possess an "after the war" British production which will be a standing example of top-hole engineering to the world. MOVEO.

REJOINDER BY "CHINOOK."

In reply to my various critics, let me say that I certainly did not wish to be unfair to American machines. I must confess, however, to feeling a sort of fed-up-ness at having had the merits of the U.S. production held up as a model of desirability by some scores of correspondents, while there seem so few journalists who thought it worth while to come out with what they consider to be the plain unvarnished truth. The journalist may not have the workshop experience of the repairer, but, at any rate, most new models, both American and British, pass through his hands, so that his comparisons should be of some little value; also, if he is up to his job, his judgment is not merely superficial.

As regards my experience of U.S.A. machines, I may say that for eight years I lived in the midst of them, so can probably claim rather wider knowledge than my critics, whose experiences are clearly limited to the one or two makes which reach this country bearing the hall-mark of America's best factories. Correspondents are fond of comparing America's two or three best machines with the various dumped lot of British mounts that find their way to obscure regions Overseas, which is manifestly unfair. Let us take the Triumph, Lea-Francis, Sunbeam, B.S.A., P. and M., Norton, A.J.S., and Enfield—eight of our best-known makes—and see if we can find eight Americans that can in any way compare with them on the points raised.

I repeat that there are some features in every-day American design and finish which no British manufacturer of repute would tolerate for a couple of hours. There may be one or two Americans that are as good as Britain's best as regards their power units, but even these are inferior to the average run of well-made British machines on more points than they are superior. Moreover, the power unit is not *everything* in any machine.

Let us, at any rate, be honourable with ourselves, and not pretend, above all things, that we believe American design to permit of the same degree of accessibility as ordinary British practice. Such a contention is absolutely ridiculous. One of the best (electrically equipped) Americans of to-day took three skilled engineers of my acquaintance fifteen men-hours to decarbonise! If I possessed a Britisher that I could not decarbonise single-handed in an afternoon's work, the readers of *The Motor Cycle* would hear about it. CHINOOK.

Export of Motor Cycles from 1906 to 1917.

The Million Mark passed Twice during the last Four Years.

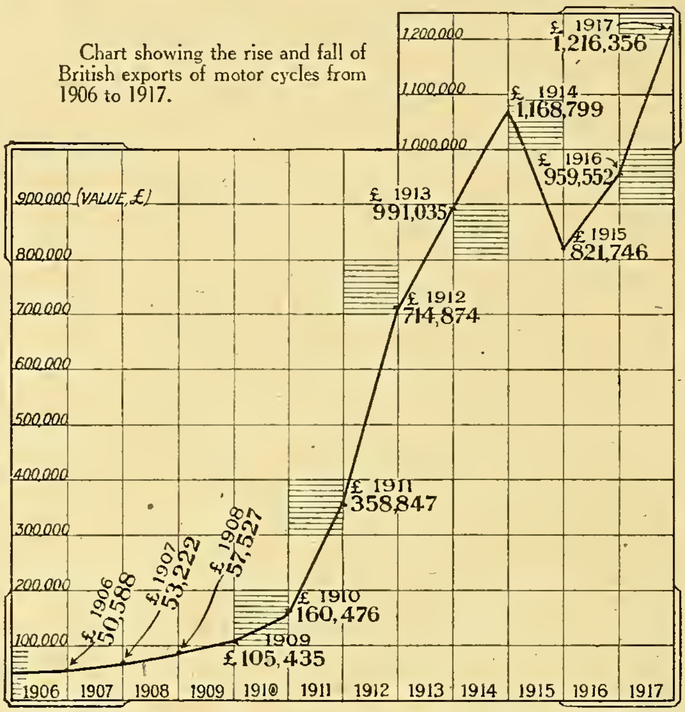


Chart showing the rise and fall of British exports of motor cycles from 1906 to 1917.

THE chart reproduced herewith shows how the British motor cycle industry has progressed since 1906. Last year is given as being the biggest export year on record, and it was stated as such in *The Motor Cycle* of Jan. 31st. There is a word of explanation needed, however, on this point. The figures for 1914, viz., £1,168,799, were taken from the Board of Trade returns for December, 1914. Since quoting them we find that the following year (December, 1915) the Board of Trade altered the figures to £1,305,250. If the latter are correct then 1914 is the record year. The rise from £160,476 in 1910 to £1,168,799 in 1914 is an increase of 700% in four years. It would be well to ask those who are continually nagging at our manufacturers on their alleged indifference to Overseas trade whether their plaint is justified. Few industries can show a better record, but even so we firmly believe that with increased energy and a totally revised method of distribution, and above all a revision of the price and stocking of spare parts in the various motor cycling centres Overseas, these figures can be tremendously increased. No better proof can be shown than the figures for last year. If such a total can be amassed under unfavourable circumstances, what may we expect in normal times?

* * *

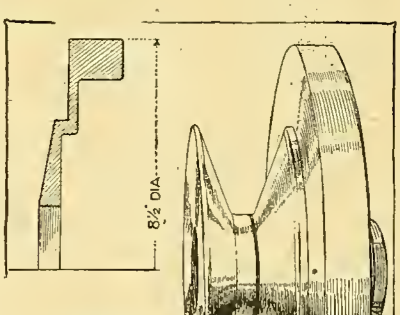
Outside Flywheel and Adjustable Pulley.

An Idea which will Appeal to Owners of Low-powered Sidecars.

MOST riders of machines fitted with outside flywheels and direct drive to the rear belt rim have felt the need for an adjustable pulley, and have perhaps gone so far as to say unkind things about outside flywheels that have prevented the use of this other useful accessory. Similarly many riders of standard machines fitted with inside flywheels and adjustable pulley all complete long for an extra flywheel to give a rather better torque when the last ounce of power is required from the engine.

An invention recently provisionally patented by Lieut. G. S. Burney, R.E., provides for the fitting of both the above suggested desiderata, and is simplicity itself in its application. It consists of an adjustable pulley, the outside—removable—flange of which is made of increased diameter to form the web of a flywheel, and is provided with an enlarged periphery or rim to increase the flywheel effect.

The locking and moving of the movable flange are recommended to be carried out on the well-known Triumph principle, and, of course, the size of the fitment depends entirely on the machine for which it is intended. Presumably the inventor intends to make it to fit any make of machine provided sufficient market is guaranteed, while, of course, a standard pattern could easily be put on the market, which would be made so that it could be easily adapted by a competent mechanic to fit any individual machine.



A provisionally patented arrangement which enables an extra outside flywheel combining an adjustable pulley to be fitted to existing machines.

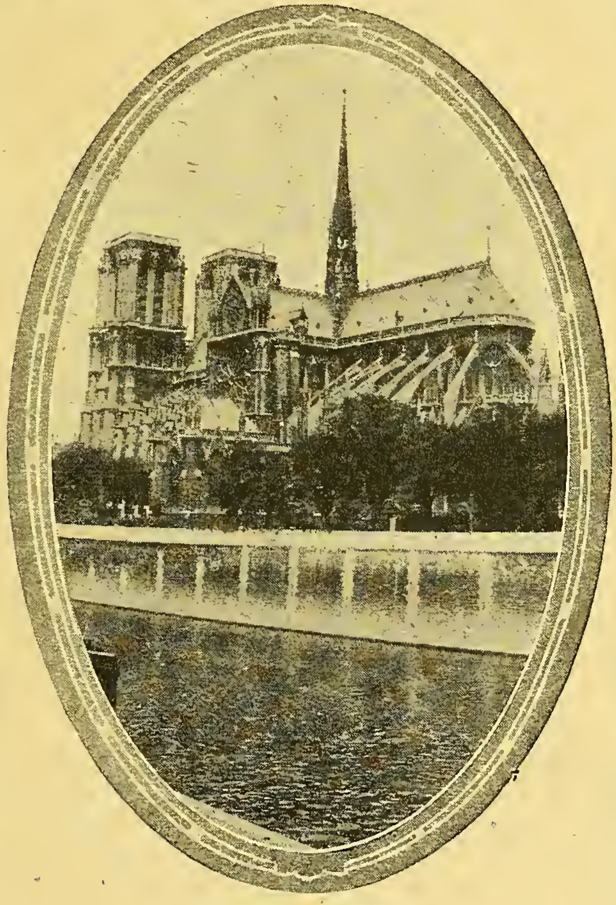
The idea is certainly full of promise, and should prove a very useful addition to many a 3½ h.p. saddled with a sidecar.

The British Committee of the French Red Cross have just heard of the further award of decorations to a number of their volunteer motor ambulance drivers serving in one of their convoys in the vicinity of Verdun. The names of the drivers so honoured are Mr. A. A. Hannay and the Hon. C. Hill-Trevor, Croix de Guerre with silver star; Messrs. J. Bower, W. D. Linsell, and E. Hartley Hacking, Croix de Guerre with bronze star.

LITTLE SKETCHES IN PRE-WAR FRANCE.

I.—A Jaunt from Dieppe to Paris *viâ* Gisors and Asnières.

THREE in the morning, and a dim light on the cobbled streets of Dieppe as we wheel our little Douglases down the quay. My friend was taking a well-earned holiday from his newspaper work in America, and we had decided on a run to Paris, stopping there ten days or so, and return by Rouen. After a glance at the C.T.C. "Continental Road Book" (an invaluable handbook, and one to be remembered against happier times), we threaded our way out of the town by the Place de la Barre, the silent street giving back the contented purr of two well-tuned engines. A stiffish rise, and then we were faced by one of those blade-straight roads such as we do not know over here, bordered by tall poplars stretching into infinity, and gloriously inviting for a "blind." Too cold this morning, though, as yet, and we confined ourselves to purring along at a modest twenty-five. The tall trees drip with the moisture of the night, and the sun, struggling up sleepily behind a bank of dark cloud, reveals the far-stretching fields, ablaze with crimson poppies. The road forks, and we stop to consult the unfamiliar-looking signpost, flanked by a wooden crucifix, stained with the weather.



Notre Dame de Paris

The Mad English.

The sun mounts, growing more powerful, and as we speed by we can see peasants, their backs bent with years on years of labour, trudging to work. Feeling thirsty, we stop at a wayside cottage. Someone is about, and we wait for a moment looking at the specklessly neat interior, and the gleam of freshly-scoured copper pans. An old crone, her face incredibly seamed with wrinkles, hobbles out to inspect the two mad English. No, she has no cider, "*mais, il-y-a du boisson.*" We try it, an enormous flagon of the drink of Normandy, rather like a harsh cider, and very gratifying. We pay our twopence, and paddle off. Forges-les-Eaux will do nicely for breakfast: probably seven o'clock will not be too soon in this early-rising country. Riding absently on the left side of the road, we nearly foul a plodding haycart, recovering just in time to return the courteous "Good-day" of the driver. A menacing hiss—for all their fine engineering these vaunted roads are appallingly loose. My friend's front tyre! Only five miles; perhaps we can make it. We do make it just as the feel of the rim on the road is becoming rather too acutely perceptible.

"The Inn of the Candid Friend" invites us, and in response to our enquiry the waiter sets before us huge bowls of milk tinged with coffee, a gargantuan hunk of Gruyère cheese, and two of those enticing crisp loaves that look as though they were bought by linear measure. The puncture can wait till afterwards. Our host's little son comes out to inspect *ces Anglais,* accompanied by a very English-looking fox terrier.

A leisurely meal, and a pipe to follow, while we write picture postcards home, which the obliging postman collects after selling us the stamps. The bill for our breakfast is surprisingly small, "*derisory*" as the French say. The tyre set right, we set out for Gournay, sped on our way by a little knot of onlookers, interested in our compact little steeds.

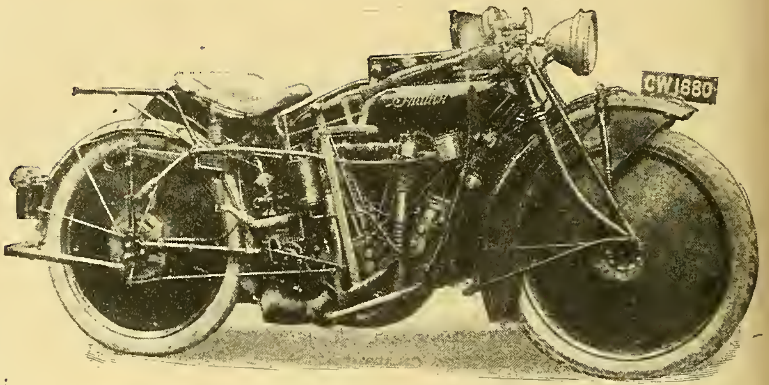
Disaster.

Ten kilometres out of Gournay disaster overtakes us. My friend Pat, who is used to the American twist-grip control, is flung from the saddle while giving a too absorbed attention to the multifarious English levers, which he proceeds to curse "*en gros et en detail,*" seated ruefully in the road. He has suffered no more than a badly-grazed knee, and mounts protestingly in order that we may reach Gisors, where there is reasonable certitude of finding a chemist. A flamboyant sign, "Livery Ones, drink the Water of Miers," in the main street would seem to indicate that we have found what we wanted. I explain to the assistant that my companion has "made bad to the knee," and the wound is thoroughly dressed with peroxide of hydrogen, and tightly bound. A sign "Here one Eats Tripe all the Days" invites to lunch (but not on tripe!), winding up with a Camembert cheese riotous with life—a thought too lively for the unacclimatised. After this all goes well, and we bed down for the night at Asnières—the Kingston of Paris—delightfully tired, and soothed by the vivacious sounds of the gay French street outside, with all Paris to explore on the morrow.

R.H.B.

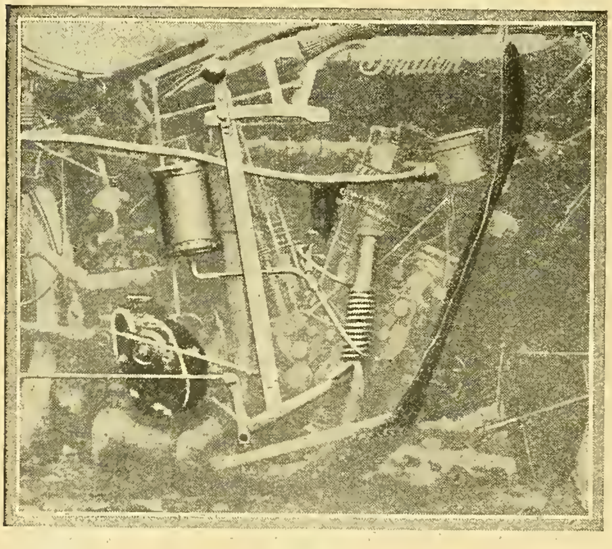
A Motor Cycle with a Steam Injection System.

Various other Refinements go to Make a Specially Well-equipped Outfit.



The Indian outfit owned by E. Brown, Burnley, to which a Mariana steam injection system has been fitted.

FROM time to time the question of mixing steam with the charge of gas crops up in our correspondence, and no doubt there is much to be said in favour of some arrangement which enables this to be done. Mr. E. Brown, who uses a Mariana steam injector on his Indian, has sent us a few notes concerning his experience with such a device, which will interest many who are desirous of obtaining smoother and cooler running of their engines. Mr. Brown says: "The Mariana steam injection system, which I have fitted, consists of a metal water container fitted to the down tube from the saddle, under the bottom of which is fitted a tap to regulate the water supply. When this is turned the water runs through copper pipes round the front exhaust pipe, which convert the water into steam. This is then taken into the carburetter through the bottom air intake. The machine runs far more 'silkily' when this is working, and the engine picks up much better. I have tried various substitutes in the tank with this device working, and after the engine has got warm it runs as well on paraffin and substitutes as on petrol. The petrol consumption is, I think, about three miles to the gallon better since I fitted steam injection.



Detail view of engine showing method of fitting the device. Various other alterations and fittings will be noticed—the position of speedometer, hand-controlled gear lever, and leg shields.

"The photograph also shows the metal leg shields, which allow cold air to impinge on to the cylinders. I have fitted the speedometer to the front down tube instead of on the top tube, and find it is much better to read in this position. A hand control for clutch has been provided, and is conveniently near the gear lever. Round the cylinders I have fitted copper springs for cooling purposes, and think I have obtained a certain amount of improvement from their use.

Sidecar Fittings.

"The machine is fitted throughout with electric lighting, which can be turned on from a switch in the sidecar. This can be done without stopping the machine. I like the Indian very much, and could have disposed of it many times had I wanted. The sidecar, which is fitted with a large bulbous back containing the lighting accumulators, is upholstered in grey leather, and looks very smart. It has windscreen, storm apron, step, cupboard in front, and large adjustable luggage grid. Disc wheels replace the ordinary type, and mud protectors have been arranged for the front wheel. A heavy rubber buffer is fitted in the coil of the front spring to prevent this from rebounding, as the roads in the North are rather rough. I trust these particulars may be of interest to readers of *The Motor Cycle.*"

OUR HARD-WORKED POLICE.

THE other day an employee of the Service Co., Ltd., was driving a customer home in a motor bicycle and sidecar. They were stopped by traffic at Oxford Circus, and while there some other vehicle knocked up against the sidecar combination, causing trifling damage. The policeman on point duty immediately took an interest in the matter, with the result that the Service Co. subsequently had no less than seven visits from the police. So far as can be ascertained all the men were of military age; three or four of them called for exactly the same purpose, namely, to inspect the company's register. The firm has been summoned because the driver of the sidecar had forgotten to renew his driving licence.

The managing director of the company, Mr. G. W. Mann, writes, "My main point, however, is that it seems worth calling some attention to the fact that when there is such a cry about shortage of labour, even our police force should be called upon to make some arrangement by which the time of their staff is not fooled away in this silly manner."

A British Manufacturers' Corporation.

A National Scheme for developing British Export Trade.

IN our issue of February 7th we dealt with the problems involved in reconstruction after the war so far as they are likely to concern the British motor industry. As we stated in that article, the problems to be met in after-the-war trade are extremely numerous, and are not such as are likely to be of simple solution. Sir Charles Mandleberg, of Pendleton, Manchester, has for some time been paying deep consideration to the subject of reconstruction after the war in relation to export trade and the development of British export trade by means of a kind of manufacturers' union.

As Sir Charles points out, post-war taxation is bound to be very high, and we cannot hope to pay all our liabilities out of the profits of home trade; to do so would be tantamount to taking in each other's washing: consequently our export trade takes on an importance even greater than any it has previously possessed, and the best means for developing this export trade is by means of the man on the spot, or export local representative in the territory to be developed.

The main point of Sir Charles's scheme is not so much to replace the representatives of those large manufacturing houses which already have Overseas branches or representatives, but to provide a Corporation of manufacturers and producers, each of whom will subscribe a certain amount annually, and this amount will be devoted to the provision of an Agent-in-charge in any particular territory to be exploited. As Sir Charles states, a Corporation of a thousand members, each subscribing £100 or £200 per annum, would have a fund of from £100,000 to £200,000 per annum, and such a fund would enable the equipment of highly-efficient Overseas depots that have the interests of British trade at heart. In all probability the majority of the members of this association would be business houses to whom export business would be something of a new venture.

The "Agent-in-charge."

The "Agent-in-charge"—one to each territory—would act in the interests of all the members of the Corporation on the lines of the man on the spot now in the direct employ of large individual houses. His duties would really be to represent as a principal each of the members of the Corporation, and he would need, of course, to be a man of high commercial standing and able to discharge with complete satisfaction a position of high authority. He would have behind him the prestige of what might become one of the most powerful and influential exporting organisations in the world, and, on the other hand, this association would regard the Agent-in-charge as its competent representative in the territory in which he was located. The functions of the agent may be summarised as follow:

(1.) To appoint selling agents for the members of the organisations where agents had not been appointed.

(2.) To report on the standing of purchasers. Intimate knowledge at present unavailable could be placed at the disposal of members, and arrangements could be made to send with orders such reports on purchasers' standing.

(3.) To carry out any financial arrangements between producers and purchasers where transactions lay outside ordinary business routine.

(4.) To act in an advisory capacity to members if they needed information as to the best methods of securing further trade.

(5.) To get early information of possible orders and communicate immediately with the selling agents of the manufacturers concerned.

Home Centres.

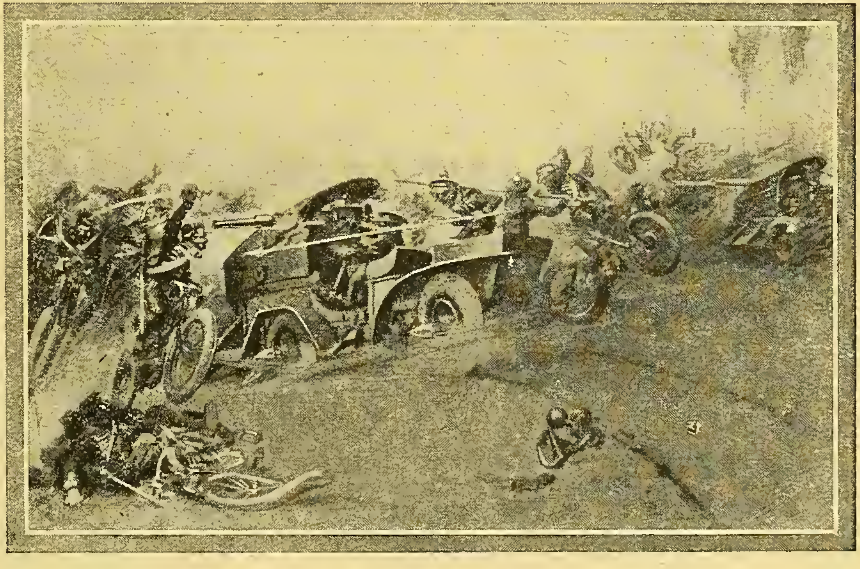
The first step to be taken towards the development of this scheme would be the opening of offices in the chief manufacturing centres in this country, with a small staff in each office. The managers of these home centres would be appointed for their thorough knowledge of the technicalities of the export trade, and would exist for the purpose of advising members of the Corporation of all details connected with the export trade, such as would require to be known before a house, previously limited to home trade, could branch out to the export line.

It is not intended that the Agent-in-charge abroad should be a selling agent, but he would appoint selling agents, when desired by members of the Corporation. Naturally, the Agent-in-charge would be responsible for seeing that no two competing firms were represented by the same selling agent. On the other hand, there would be no objection to non-competing firms having one agent in common, just as they had one Agent-in-charge.

Members whose business is of a highly technical nature might prefer to send out a resident representative of their own to do their selling, in which case it would be an undoubted advantage, and would give them confidence, if their representative could refer to the Agent-in-charge as to the best methods of developing business in that country, and for particulars of firms likely to be useful, and their standing. In an emergency, such as might arise through illness or other cause, the Agent-in-charge would be on the spot to act as he might be instructed. In the case of firms who send out their own travellers, the Agent-in-charge would be available for giving the latest advice and information, as well as to be of other assistance, to travellers on their arrival in his territory.

Legal and Banking Aspects.

It is also hoped that, on account of the high standing that would be maintained by the Agent-in-charge, special legal advantages or assistance would be secured for the members of the Corporation in the foreign territory, and the position of a capable agent on the spot would certainly increase the possibilities and likelihood of satisfactory banking arrangements. The whole matter of banking facilities, as a matter of fact, has been engaging the attention of the British Trade Corporation—a powerful organisation with a capital of ten millions sterling, now incorporated by Royal Charter.



A drawing, published in *Das Schnaufere* (*The Snorter*) in 1903, illustrating the German idea of what modern warfare might be. In those days, when most people were absorbed in improving motor cycles and motor cars for business and pleasure, the Huns were pre-occupied with designs for employing them against neighbouring nations. The sketch represents an attack by motor cycle hussars on a squadron of armoured cars, and is entitled "The Battle of Port Petrolia, A.D. 1925."

LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

THE WOMEN'S LEGION.

Sir,—Will you allow me to draw your attention to a paragraph on page 108 in the issue for January 31st, and to relate my experiences in connection with the same matter?

The paragraph, entitled "Women Drivers for Government Motors," states that these are supplied through the Women's Legion, which organisation "is in urgent need of recruits, who should have some knowledge of driving, but need not be highly skilled."

I own a motor cycle, and have a slight knowledge of cars, and a short while ago, being anxious to take up motoring work, I wrote to the secretary of the Women's Legion, asking to be made a member, and also if I could get any further training or work through the society. I also asked for particulars about the organisation, and what I, as a member, should be expected to do to help it on.

The reply I received was a short letter, advising me to apply to the secretary of the Motor Section, and enclosing a leaflet, which contained little more than a list of the sections and the names of members on the executive committee.

I did as advised, again asking about the society, and stating that I wished to get work as a motor driver. The reply received was even more brief than the first, and after paying a small subscription I was enrolled as a member, and joined Section 2, Motor Transport.

I am still a member of the Women's Legion—though concerning the society I am in total darkness—and it does not seem as easy as it would appear to obtain work through that organisation. (MISS) VIOLET MOORE.

St.-Leonards-on-Sea.

THE DYNAMICS OF BICYCLE LOCOMOTION.

Sir,—The author of the article on this subject in *The Motor Cycle* for January 31st appears to be confusing centrifugal force with the *force peculiar to the bicycle*, which, he considers, gives stability to the machine.

Are we to congratulate him on the discovery of a new force, overlooked by Newton, or is this "force" our despised friend gyroscopic action in another guise?

The motion of a bicycle rounding a circular arc is simple. The machine is simply banked until the resultant moment about the line of road contact of (1) gravity, (2) centrifugal force, and (3) gyroscopic torque due to precession of any rotating parts is zero.

The case of auto-stability, *i.e.*, the capability of the machine to keep a straight course when the handle-bars are untouched, is a very different matter, and a simple, non-mathematical explanation appears to me to be almost impossible.

When a bicycle is subjected to a side load and tends to fall away from such load, the front wheel is subjected to a torque about a longitudinal axis which causes it to rotate (*i.e.*, precess) about a vertical axis (*i.e.*, the steering column). The direction of this precession is such that the forward edge of the wheel moves toward the side of falling.

The bicycle then moves in a curved path, and the centrifugal force thus produced combines with the gyroscopic torque due to the precession to bring the bicycle up to the normal position again.

The main effect of "castoring" the front wheel is to cause the centrifugal force and the road friction to form a couple tending to restore the plane of the front wheel back into the longitudinal plane of the machine ready to counteract another tilt.

All the above described movements are, of course, interconnected, and can only be completely explained mathematically.

In an article in the *Automobile Engineer* for October, 1915, I went into the whole subject, obtaining several interesting results. For instance, the beneficial effect of "castoring" the front wheel was demonstrated, and an explanation was given of the process of steering a bicycle by body movement without touching the handle-bars.

Account was, of necessity, taken of the precessional motions of the front wheel, and the resulting effects due to centrifugal force and gyroscopic action, which Mr. Jones so lightly dismisses. GEORGE S. BOWER.

[We purpose to publish extracts from the article to which our correspondent refers when space permits.—ED.]

PETROL FOR THE MUNITIONEER.

Sir,—In expressing my opinion on the munition worker and his cries for petrol, I am voicing the opinion of many motor enthusiasts who are in France.

We who have spent three years out there, and to whom motor cycling is a forgotten pleasure, are disgusted with *some* of the letters appearing in your paper. Since the war, these people have had week-end joy-rides until the shortage of petrol has called for drastic restrictions. Immediately *their* motoring is stopped, they fill your paper with their narrow-minded laments.

My advice to the young and single munitioneer who states "two gallons a month for that fresh air which is essential for my health"—to that man I say, "Join up and come out here. There is plenty of air in Flanders, and any amount of exercise. The Army will teach you how to keep fit. One day out here will make you realise that *we are at war*; and once you have got that, you will see my opinion of your unpatriotic and selfish request has been very mildly stated."

B.E.F. J. CARROLL, LT.

Exponents of Indian motor cycles, R. G. Buck and S. Pasmore, who set up a sidecar record between New York and Chicago. Their time for the 992 miles was 43 hours 20 minutes, which beats the previous record by 54 minutes.

EXHAUST POPPET VALVE DESIGN.

Sir,—I have read with interest the letter by "Olivos" in your issue of January 10th on my valve idea, and am sorry he should not have had the best results. May I assure him that, if his engine is a M.A.G., there is no reason why he should not obtain them, provided the valves are *correctly* ground in, and that the spring adjustment and *alignment* are right.

He writes that his valves were perfectly ground in. That may be as far as the actual matter of grinding is concerned, but without a doubt he has not *correctly* carried out this procedure. It should be done as follows: After the seats have been well ground, clean all trace of emery off the top seat of the valve and its seat in the cylinder, and then place some emery or grinding compound on the *lower seat in the cylinder only*, and continue grinding until the valve will no longer touch the lower cylinder seat; this gives a clearance between the lower seat in the cylinder and the valve which is required, and this clearance will always be maintained.

The reason why the grinding compound should be put in the cylinder for the last grinding operation is that, if it is placed on the valve, some of the compound when inserting the valve (to continue the grinding) will be caught and held by the top seat in the cylinder, and consequently the top seats will also be ground, not allowing the clearance, abovementioned, to appear.

When the valves are ground in in the manner above explained there will be but poor compression when cold, but when the engine is hot it will be perfect, which is as it should be, and this is because the valve expansion closes up this clearance.

Now if the grinding is carried out so that there is no clearance formed, when the engine is hot the expansion lifts the top seat of the valve from its cylinder seat, and allows the explosion to exert its pressure under the full surface of the top seating of the valve, causing it to lift, as has happened to "Olivos's," but the reason that he experienced no popping or lifting at slow speeds was because the leakage past the top seat was too great, whilst at high speeds lifting will happen if the grinding is not correctly carried out, and also if the springs are not exactly in dead alignment or not exactly central over the valves, causing the latter to rub against the cylinders, and thereby losing the full elasticity of their springs.

"D.L.E." in your issue of December 6th last sets out the matter quite correctly, and he is right in his assumption that the valve rockers are exactly the same as were used with the ordinary type valves, but they are not proof against a solidly compressed spring at one end and a cam at the other, which can be the only cause of their fracturing, barring a seized valve stem with either type of valve; in fact, the valves are the only parts that have been changed.

As "D.L.E.'s" letter was written some weeks ago, I will reiterate his statement. He writes: "It is impossible for any lagging to occur." He is correct, and as the engines with suitable carburetter adjustments will turn over at 5,760 r.p.m. his statement is obvious. "Popping occurs only when the engine speed is too low for the load on the engine"—naturally, as there is far less compression at speed; "in other words, they act somewhat as safety valves, and retarding the spark stops the popping unless a change down is called for." He is right here also, but I wish to add that if the spring pressure is right and ignition timing likewise no popping will even then happen, the popping being also an indicator, advising one when to retard; but if the ignition is not retarded the valves act as safety valves, and the "pop" takes place instead of the "konk."

I have never found that popping would occur unless the valves were improperly ground, no matter how long or how hard the engine had been driven.

May I also assure "Olivos" that these valves do not require grinding, and are much better left alone? I do not allow mine to be touched, and they have not been ground for many years. I am using an engine made in 1912, and the seats on the valves and in the cylinders are as polished silver in appearance.

Now with regard to the levers, if the springs are so compressed that before the cam has reached its highest point the spring coils are in contact, naturally no lever will stand, and some part, of course, must fracture, provided that the engine can be turned over, and this has more than likely been experienced by "Olivos," as he mentions clearly that "when the valves were fully open it was impossible to move them at all." If the grinding be carried out so that the pressure can get under the top seat of the valves it is impossible to hold them down, but if the engine is run about 100 to 150 miles the valves will work into their correct clearance and remain so, though, of course, full power will not be obtained during that distance. OSBORNE DE LISSA.

GOODS MADE IN GERMANY!

Sir,—I have followed with keen interest the chain of correspondence on the above subject you have so kindly allowed to be published in your valuable and interesting paper. I may say I heartily appreciate the genuine spirit in which you have accepted the varied opinions, and it is a pure and fair intimation that at all times, and under any circumstances, the "Blue 'Un" is a perfect sporting journal, and indisputably repels the attack and pledges its belief in "playing the game."

Without fear of doubt, it has somewhat created a surprise to find that Mr. Chas. S. Ives (now a man of large kidney) has gained the favour of some more poor inoffensive supporters. Personally, I feel that their education on this vital subject has been seriously neglected. They are probably deemed to be patrons of the *Strafe Gazette*, in which it incessantly states that "Englishmen should not be allowed the breath of air." Still, Chas. S. Ives and his colleagues are firm believers in allowing the product of German sweated labour and prison-made goods to be dumped into English markets and cast the poor Britisher and his lot to the hospitality of the general community. But my motto is, "Let every Englishman be allowed to *live* in his own country." I am a fair judge in this direction, as I have personally seen in my own district untold sufferings amongst the people through foreign competition. Since the importation of German goods has justly come to a close the industry affected, I am pleased to say, is working as briskly as ever. Such instances prove that in your advertisement you have taken the "bull by the horns."

I am inclined to feel that I am trespassing too vigorously on your limited space, so, in conclusion, I can assure you that your esteemed paper has proved a boon and a blessing to the motoring fraternity, and I hope and trust you may not have been the financial sufferer and victim of sleepless nights as a result of Mr. Chas. S. Ives's childish decision.

E. O. ROBINSON.

Sir,—It was with considerable surprise that I read Mr. Tom E. Tanner's opinion on this subject. I should not have thought that one of our 1914 lads could have held such an opinion.

By refusing German goods, etc., I cannot conceive how we should be building up a German Prussianism at home. What would be the benefit of winning this war, if we were to allow Germany to use her skill and ability (both of which she undoubtedly has) to recapture the trade she had before the war?

No, sir, a German is a German, and he must be dealt with as such. When he begins to realise the cowardly and despicable part he has played in this war, then—and only then—is it time to commence to fraternise with him. No doubt we shall make friends, but not, I hope, until he has learnt his lesson.

I think Mr. Tom E. Tanner is perhaps *too* kind-hearted, and he might note that to do good we sometimes have to resort to painful methods. Germany is like a very wicked child who requires "licking into shape," and it cannot be done by half measures.

I heartily agree, sir, with the attitude you have taken, and am sure the supporters of Mr. Chas. S. Ives are vastly inferior to those of the Editor of the "Blue 'Un."

Durham. NORTHERNER.

Sir,—May I say a word in condemnation of the attitude taken up by Ives *et hujus generis illis?* How can your matured decision to decline to touch the money of murderers, thieves, and worse be called "Prussianism"? How can an honourable man take the money of scoundrels without some association with them? And there are two wise sayings—"Birds of a feather," etc., and "If we touch mud some of it will stick."

You may be assured that the greater number of your readers agree with you—since surely motor cyclists as a whole are honour-loving Britons, hence the enlistment of despatch riders. I have seen part of France—I have been through more than one Zeppelin raid—my great friend was stabbed in seventeen places; but not for this would I support you. We must forgive our enemies, but there is absolutely no reason why we should penalise our own good lads and allow the Hun the run of all his old trading facilities. The man who tries to sell me German-made stuff had better get a move on into the next parish one time.

Forgive such a long letter on the ground that, as an invalid and a lazy man, I should not have troubled to write unless interested. E.C.H.

Worcestershire.

FLYING FACTS AND THEORIES.

Sir,—One point seems to have been overlooked by Mr. Aston and his critics in considering the question of the effect of any departure from a direct course in producing a change in the pilot's own sensations, or in the power required to drive the machine, namely, the gyroscopic effect of the propeller, or, in the case of a rotating engine, of the engine itself. This effect is more marked in the latter case, of course.

Without going into a rigid proof, the following will suffice to give some idea of the nature of the gyroscopic forces brought into play by any change in direction.

Consider the rotation of the engine without any reference to other forces involved in flight.

If I = moment of inertia of all parts rotating about centre of shaft,
α = constant angular acceleration (radians per sec. per sec.),

Then torque, T, required to maintain constant acceleration α,

$$T = I\alpha \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

If a body starts from rest, acted on by a constant couple T lb.-ft., for t seconds, then the angular velocity (ω) at the end of t seconds will be

$$\omega = \alpha t$$

$$\text{Whence } \alpha = \frac{\omega}{t}$$

Substituting in (1) for α,

$$T = \frac{I\omega}{t} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

If T = couple required in lb.-ft. to turn machine in any plane at right angles to plane of revolution,
ω_1 = angular velocity of the engine, etc., about an axis through the centre of rotation,
ω_2 = angular velocity in a plane at right angles to ω_2,
t = time required to make a complete turn of (ω_2),

Change in angular velocity in one complete turn of (ω_2)

$$= 2.\pi.\omega_1$$

Therefore, total torque required to turn engine, etc., in a plane at right angles to its own plane of rotation—

$$T = \frac{I.2.\pi.\omega_1}{t}$$

$$\text{but } t = \frac{2\pi}{\omega_2}$$

$$\therefore T = \frac{I \times 2.\pi.\omega_1}{2.\pi.} \times \omega_2$$

$$= I\omega_1.\ \omega_2.$$

This also accounts to a certain extent for the loss of speed in turning.

The fact that the torque, as given above, acts in a plane at right angles to that of intended flight may seriously upset the pilot's sense of direction, for in an aeroplane, which is absolutely unrestrained in space, this force will manifest itself at every turn of the machine. In turning sideways, for instance, there will be a tendency for the nose of the machine to rise or fall according to the direction of the turn. This, coupled with the ordinary banking effect, gives rise to the side-slipping and spinning so often experienced by pilots.

C. F. LLOYD.

DRIP FEED LUBRICATORS.

Sir,—I notice an article in *The Motor Cycle* of November 29th, which says that visible drip feed lubricators are proving a wash-out, and on this point I am afraid I cannot altogether agree with the article.

I have a 6 h.p. 1913 Enfield combination, and I can safely say that I have had practically no trouble with the vacuum drip feed which the Enfield Co. fits on its machines; in fact, the only trouble I have had (and that only twice) was the chocking up of the oil pipe with dirt.

To my mind, it is an ideal lubricator, as the faster the engine revs the faster the oil flows; and it has this great advantage, that it is safe from small youths playing with it and over-oiling the engine, and one can set the regulator and leave it in that position, and it will do its work efficiently until the oil in the tank is exhausted. In addition, the Enfield Co. has a hand pump with a two-way tap, which one can use in an emergency, and which also feeds the gears.

A SATISFIED ENFIELD RIDER.

SPRING FRAME DESIGN.

Sir,—I should like to suggest one or two little points for criticism in the Warner spring frame design illustrated on page 70 of your issue of January 17th.

This design appears to be almost the same as the old P. and M. front fork, which was unsatisfactory owing to the wear on the pins at the various joints.

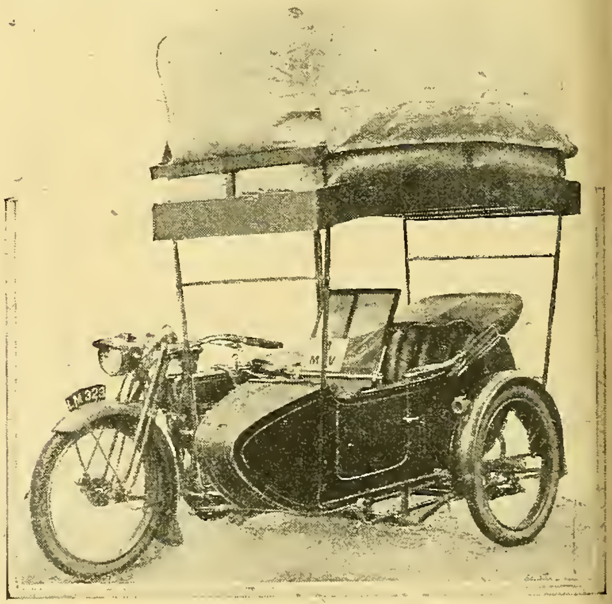
I am sure that Mr. Warner's system would give trouble in practice, owing to the short shackle pins being cut into by the plates which carry the hub; the holes in the plates would also rapidly wear oval.

The spring in its present position necessitates high saddle position, high carrier, and long wheelbase.

It would be better to attach the rear stand to the rigid part of the frame, since in its present position the whole weight of the machine is on the spring with the stand in operation, which will render adjustments to the springing system somewhat difficult.

Spring frames are undoubtedly attractive, but it seems a far cry to anything in that line ever approaching the grace and symmetrical outline of a certain much-abused front fork (which shall be nameless). Perhaps the P.V. as it was sold in 1913 was as satisfactory as a spring frame could be in general lay-out, but possibly it was not adaptable for countershaft or chain transmission, as I remember it was sold with an engine-shaft gear; nevertheless the design had the merit of simplicity.

M.T., A.S.C. WHARFEDALE.



SIDECARING WITH COAL GAS.

A Harley-Davidson outfit fitted up to run on coal gas by J. A. Masters, publicity manager of the Harley-Davidson Motor Co., Ltd., London. It has been given a very fair testing and found satisfactory, although the power on hills does not compare favourably with that obtained on petrol. The gas is taken by a ⅜in. pipe through the extra air port of the Schebler carburetter, and the supply is controlled by a tap just before entering the carburetter. The automatic air valve is not interfered with, and operates in the usual manner. Except at high speed no ill effects have been felt in consequence of the extra wind resistance.

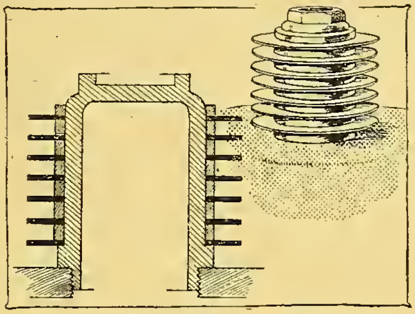
A Compression Reducing Valve Cap.

An Arrangement whereby Compression may be Reduced and Extra Cooling Provided.

MANY motor cyclists have tried experiments with the object of reducing the compression ratio of heir engines, and to meet such a need t. C. S. Burney, of Durrants, Northhurch, Berkhamsted, has recently atented a special valve cap. This cap, as nay be seen from the illustration, conists of a cylinder that projects above he normal valve cap opening, and is lso provided with radiating fins after he fashion of those on an ordinary airooled engine.

Details of Construction.

The working of the device should be airly obvious, but we may point out hat the patent cap is intended to relace the standard fitting, and, of course, s made in the correct sizes for various ngines, so that this may be done quite asily—by simply removing the old cap and inserting the new one. The radiating fins, made of some such metal as copper or aluminium, are detachable, and are held apart by distance pieces that are also detachable, so that the number of fins on the cap at any particular moment may be easily varied to suit the needs of the engine to which it is fitted. Obviously all engines do not require the same amount of extra cooling, and provision is made for this in the detachable construction of the fins and the use of the detachable distance pieces.



A device for lowering compression and increasing cooling area of an engine.

Adaptability.

There is no reason why valve caps of different depths should not be made for engines of the same type, so that the extent to which the compression is lowered may also be easily altered by the fitting of a different cap. The same fins, of course, would fit whichever cap happened to be in use.

Judging from the number of queries we are continually receiving *re* compression reducing devices we should be inclined to prophesy a ready market for this valve cap.

◆

Some Criticisms of Front Brake Design.

Weak Points of the Rim Brake. A Good Alternative.

SURELY it is time manufacturers woke up to the fact that motor cycles need something more satisfactory than the ordinary stirrup type of glorified push-cycle front brake.

On four out of five machines these brakes are entirely out of action; in fact, in some cases motor cyclists absolutely refuse to have a front brake of this type on their machines, and among the first things they attend to is the front brake, and their attention takes the form of entire removal and consignment to the nearest rubbish heap. In fact, they are prepared to risk the law rather than keep such a brake on their machines.

Some Disadvantages.

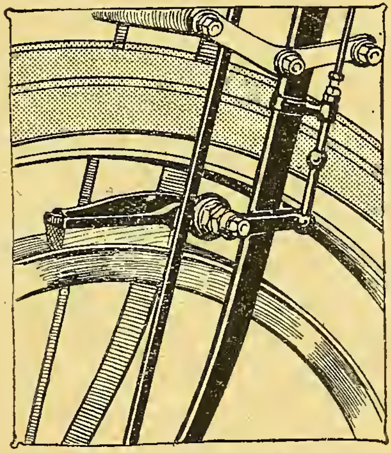
The reasons why the stirrup type of front brake is unsatisfactory are many. It fits close to the tyre, and is very easily clogged when muddy roads are traversed in a day's run. If the rim be the least bit dented—and any all-weather motor cyclist knows how a rim becomes dented when travelling fast on a rough road—and the tyre gives, then the brake power is exerted in jerks, and that is the one way in which brakes must not be applied, because on wet roads skidding is caused, and on dry roads unnecessary jars are communicated through the frame. They rub enamel off the rim, so rims on which these brakes act are usually plated, and thus the weather-resisting properties of the machine are seriously impaired.

A few makers of motor cycles—notably the B.S.A., the Enfield, the Allon, and the Lea-Francis—get over the difficulty by mounting a brake rim with a single large shoe, similar to a rear brake, acting on it on the front wheel, or, in the case of the lightweight Allon, a drum with a coil round it. The Indian and Excelsior and others, on the other hand, fit two brakes—one hand and the other foot-operated—on the back wheel, and thus evade the difficulty entirely.

The brake fitted to the heavyweight Allon, to my mind, rather falls short of the mark. As it is applied on the hub side of the brake rim, it has to be moved before the wheel can be taken out, unlike the B.S.A., Lea-Francis, Enfield, and others. I hope the Alldays and Onions company will pardon this criticism of their otherwise excellent machine.

The Lea-Francis.

In one of the last trials before the war, marks were given at the finish for machines having both brakes still working properly, and the Lea-Francis machines gained these marks, while many others had their front brakes totally out of action. This certainly speaks volumes for the type of brake with which the Lea-Francis was fitted, and this machine was among the first to adopt this type of brake as a standard fitting.



A type of front brake advocated by the writer.

Surely, when these brakes are less liable to go wrong, are more powerful, and do not interfere with the removal of the wheel, it is obvious that they are superior to the old stirrup type, which is merely an enlarged edition of a push-cycle brake.

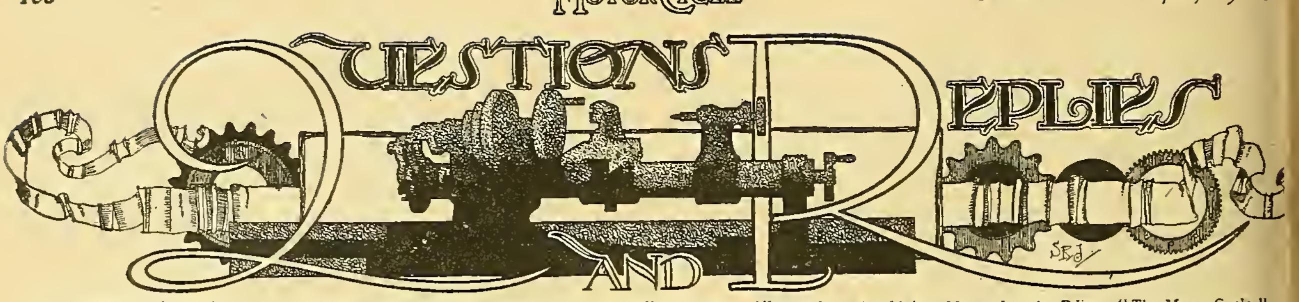
In my opinion the front brake is the one feature on almost every British machine deserving of condemnation. ARGON.

GAS PERMITS.

New Order in Force February 10th.

THE Board of Trade has issued the following announcement:

Under the provisions of Clause 11 of the Motor Spirit (Consolidation) and Gas Restriction Order, 1918, motor vehicles fitted with gas apparatus may not be driven after February 9th without a gas permit issued by the Petrol Controller. Forms of application for gas permits will be furnished on request by the Petrol Control Department, 19, Berkeley Street, London, W.1. If the motor vehicle were fitted with gas apparatus before January 3rd, 1918, or has since that date been fitted with apparatus ordered before December 21st, 1917, a gas permit will be issued on application, subject to certain conditions. If, however, a motor vehicle is not at present so fitted, or if the order for the gas apparatus has been given since the intention to restrict the use of gas was announced, the application will be considered on its merits, and a gas permit will be issued only in those cases where a motor spirit licence would otherwise be granted.



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Carburetter Flooding.

? Please let me know what would be likely to make my engine miss three or four times in succession when the machine gets a heavy bump on the road. The carburetter and petrol pipes are clean and the plug wire is secure at both ends.—M.K.

The trouble is probably due to the fact that the bumping causes the carburetter needle valve to bounce off its seating, allowing an excess of petrol to enter, which upsets the mixture, making it temporarily too rich.

Advice on Tyres.

? I have a 3½ h.p. sidecar combination (registered weight 220 lb.); my own weight with coat is about nine stone. I generally take a passenger weighing about twelve stone, hand luggage, and a tin of petrol. (1.) With such a weight, and taking into account the present state of the roads, how long do you consider that *(a)* sidecar, *(b)* front wheel, and *(c)* back wheel tyres should last? The tyre used was heavy, 26×2½in., to fit 2¼in. rims. (2.) How many miles should a heavy tyre run on the back wheel before the pattern is worn off? Mine seemed to wear smooth almost at once. (3.) Do you consider that *(a)* vulcanising or *(b)* retreading pays? If so, at what stage should it be done? (4.) What can I do to make my tyres last longer, or what can I avoid doing? I ran a heavy cover for 1,185 miles (493 on sidecar, 692 on back wheel), and at that distance it had worn in six places, each 2in. long, through to the canvas. An extra heavy tyre on the back wheel lasted only 869 miles. I use my brake a fair amount in traffic and on hills, but always very gently and lightly, and so far as I know have never dragged my wheel. (5.) What can be done to avoid a burst in the inner tube by nipping? I have had both sidecar and back wheel tubes burst with loud bangs, and when I looked I found the outer cover had come off from the rim on one side, and there was a huge gash in the inner tube. Both tyres had been put on at garages, and the sidecar tyre had run about two hundred miles and the back tyre about five hundred miles before it occurred. I should have thought that if they had been nipped when put on they would have burst at once.—(Miss) E.M.G.

(1.) It depends entirely upon your manner of driving and cornering, the speed at which the outfit is driven, and the alignment of the sidecar. You should get about 2,000 miles out of the back tyre, and another 2,000 with it on the front or sidecar wheel; about 4,000 out of the front, if retained in that position; and rather more on the sidecar wheel. (2.) If a good tyre, about 1,500 miles. (3.) Vulcanising is quite satisfactory if properly done, but retreading is only to be recommended for a tyre used on the sidecar or front wheel. It should be done as soon as the tread gets thin. (4.) The tyre should be of ample size, and should wear quite well. We cannot understand why yours should be so unsatisfactory, unless it is that you drive a machine possessing a very harsh drive. Are you sure that the alignment of the sidecar is correct? (5.) By fitting the tyre carefully. Bursts are nearly always caused by careless fitting. The tube should have a little air in it when being inserted, and it is best, if possible, to avoid the use of tyre levers when replacing the tube. Often when a tyre is nipped it will travel some distance before bursting.

Speedometer Drive for Different Sizes of Wheels.

? Can I fit a speedometer constructed for a 24in. wheel to a machine with a 26in. wheel, and still get reliable readings?—W.H.L.

Your object may be achieved by using a driving pinion for a 26in. wheel. The makers of the speedometer will supply you with whichever size pinion you require.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week.

Local Taxation Licence Exemption.

? I have used my motor cycl twice this year before January 21st, on both occasions for Red Cross work. Would you pleas let me know if I need pay the £1 tax, as I understand that one can claim exemption for Red Cross work —H.M.S.

There is no exemption. Under the circumstances, you will have to pay the local taxation licence.

Difficulty in Changing Gear.

? My machine is a 7-9 h.p. two speed, and my difficulty is that I cannot change from high gear to low or low to high whilst the engine is running, and if I start the engine at a standstill the clutch will not respond when let into engagement. The only alternative I have is to let in the clutch first, and start with a push, and even then the clutch will often slip out when climbing a stiff hill, or if the engine becomes at all hot. Also, why is my machine so hard to start? Once the engine is warm it will start with a turn of the kick starter, but not before. The points are set right, and the timing is correct.—F.K.

It is possible that your trouble is due to the gear box being loose on the hanger bracket, with the result that the front chain has been tightened to such an extent by the rear chain dragging the box to the rear that the sprocket has been damaged. As you are probably aware, the clutch sprocket is fitted with a bearing ring on the inside and floats on rollers. If the bearing ring is damaged or pressed into the clutch sprocket, the said sprocket ceases to float on the rollers and bears on the edges of the plates, and the clutch is then very difficult to disengage. Also, it seems as if the edges of the dogs are rounded, and when you refer to the clutch jumping out on steep hills it is probably the dogs in the gear box which come out of mesh. We should advise you to take the clutch down and thoroughly examine the parts mentioned, and also adjust the gear operating rods, so that the dogs are thrown fully into engagement with a certain amount of tension on the rods. If after making the necessary adjustment the dogs still jump out, it will be necessary to have them either replaced or reground. As regards the difficulty in starting, we should recommend you to use a fairly thin lubricating oil. Are you sure that there are no air leaks at the induction pipe or carburetter unions, or at the inlet domes?

Pre-ignition.

?

My motor cycle goes very well for some time and then suddenly stops, but after a little time I can start it again. It also slows up going round corners and up ills.—S.G.

e should say that the trouble is possibly de to the use of an unsuitable plug. haps you are using one the points of ich project too far into the cylinder al cause pre-ignition, and this would aount for the symptoms described in ur letter.

Release Valve Requires Adjustment.

?

I have recently purchased a second-hand 1917 two-stroke, and noticed that the small tube leading from the release valve to the exhaust chamber was disconected, had slipped down into the hamber, and the orifice had been plugged with a piece of hard wood. After connecting it up again, with the plug removed, I notice that there is not the same power on hills, the low gear being necessary where previously one ascended easily on top gear. Can you kindly tell me whether the back pressure from the silencer, ascending the small tube, might cause the release valve to open slightly, and so lessen the compression; whether, if this be so, the fitting of a stronger spring to the release valve would overcome the defect? An unpleasant hissing noise is caused when the release valve is opened with the tube disconnected. Perhaps others have noticed this phenomenon, and can suggest a remedy. —ENFIELD.

e trouble is entirely due to the release lve requiring to be adjusted. It should screwed down a little so that it does t open too far. It is also most imrtant that the exhaust system of a twooke engine should be entirely free from ck pressure. It is, however, practically possible that this back pressure should strong enough to open the release lve, especially as this would mean ring open the release valve against mpression in the cylinder.

Automatic Inlet Valve Queries.

?

My motor cycle engine is a 9 h.p. a.o.i.v. 1909 J.A.P. It is in very good condition, runs well on the stand and when running on the flat, but I cannot get it to go up hill. Although I have thoroughly ground the valves in; there seems to be a good deal of blow-back in the carburetter. (1.) Would you advise me to have new inlet valves? (2.) Which is the correct way to time an a.o.i.v. engine?—S.A.S.

.) We should not like to say you eed new inlet valves, but these could e examined, and you should see that e lift is not too great—say $\frac{3}{32}$in.—and at the springs are fairly strong. (2.) ou have only to time the ignition and xhaust valve, which should be done as llows: *Magneto:* Place the piston xactly on top of the compression stroke, nd connect up the magneto with the oints just about to break and the ignion lever two-thirds retarded. This will ean that the explosion, when the ignition is fully retarded, will take place when the piston has travelled about 1.5 mm. down the firing stroke. *Exhaust Valve:* Set the exhaust valve to close just after the completion of the exhaust stroke. It will then commence to open when the piston is about one-seventh of the length of the stroke from the bottom of the firing stroke.

Motor Cycling Literature.

?

Can you recommend a good book on motor cycles and motoring matters in general?—F.W.J.

The best book for your purpose is "Motor Cycles and How to Manage Them," price 1s. 6d. (post free 1s. 10d.), while, when you have started riding, another excellent book is "Hints and Tips for Motor Cyclists," price 1s. 6d. (post free 1s. 8d.), both published from the offices of *The Motor Cycle,* 20 Tudor Street, London, E.C.4.

Dealing with Unknown Persons.

?

I am about to buy an Enfield combination from a London dealer, who wants my cheque before sending machine on approval. As I do not know anything about him, will you kindly advise what action to take before sending the cheque?—T.J.

In dealing with unknown persons the best course for you to adopt is to transact your business through *The Motor Cycle* deposit system, particulars of which are given every week in *The Motor Cycle* at the head of the first column of advertisements of second-hand machines.

Accumulator Charging.

?

I have an accumulator marked "Charging rate 7 amps," and am told this is 6 volts. I also have a mechanically - driven dynamo giving out 12 volts 12 amps. Will you kindly tell me the best procedure to charge the former by the latter?—W.J.C.C.

The voltage of your dynamo may be ignored, but you must not charge the accumulator at more than 7 amps. To do this, the accumulator should be charged through a number of 12 volt bulbs, the sum of whose amperage is 7 amps.—that is to say, seven 1 amp. bulbs (*i.e.*, 12 c.p.), or three 2 amp. (*i.e.*, 24 c.p.) and one 1 amp.

RECOMMENDED ROUTES.

GREENOCK TO BRADFORD-ON-AVON.—A.W.W.

Greenock, Glasgow, Hamilton, Lesmahagow, Abington, Beattock, Lockerbie, Ecclefechan, Carlisle, Penrith, Shap. Kendal, Lancaster, Garstang, Preston, Wigan, Warrington, Tarporley, Whitchurch, Hodnet, Wellington, Bridgnorth, Kidderminster, Worcester, Tewkesbury, Gloucester, Stroud, Nailsworth, Swainswick, Bathford, Bradford-on-Avon.

BEDFORD TO DOVER, *viâ* LONDON.—G.R.R.

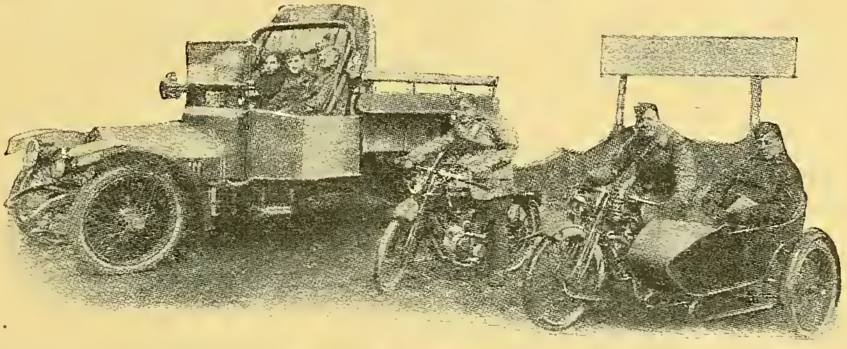
Bedford, Luton, St. Albans, Barnet, Finchley, Baker Street, Marylebone Road, Portland Place, Regent Street, Pall Mall, Cockspur Street, Whitehall, Westminster Bridge, Westminster Bridge Road, Kennington Road, Camberwell New Road, Peckham Road, Queen's Road, New Cross, Lewisham, Sidcup, Wrotham. Maidstone, Charing, Ashford, Hythe, Sandgate, Folkestone, Dover. Approximately 120 miles.

The route *viâ* Crayford,, Gravesend, Chatham, and Canterbury is perhaps flatter, but there is an enormous amount of traffic out of London and as far as Chatham.

READER'S REPLY.

Release Valve Adjustment.

I noticed recently in your valuable journal that a rider complained about his machine (a two-stroke) refusing to take air. Now I have a Villiers two-stroke machine, which had the same symptoms, and this little tip may be of some use to two-stroke riders. I could not get my machine to take air (Senspray carburetter). It would always splutter and "pop back." Recently I started to investigate, with the result that my machine now runs perfectly again. This would only apply to Villiers two-strokes with the release valve on the top of the cylinder. After overhauling the magneto, carburetter, and anything else I could find, I tried the release valve, the spring of which I found to be weak, so I fitted another new one, and also ground the valve in for about five minutes, and replaced it. I have since ridden some hundred miles, and it has not missed once, and also it will take hills much more easily than before. I have ridden several makes of machines, including big twins, but find the two-stroke as good as any for reliability.—S. H. ARTHUR (Newcastle, N.S.W.)



A P. and M. motor cycle and sidecar outfit sent over to Canada for the use of the Royal Flying Corps in the training camps of that country. P. and M.'s, as is well known, are used by the R.F.C. in this country.

("Motor Cycle and Bicycle Illustrated," New York.)

SPARKLETS

The Warner Spring Frame.

Mr. J. Warner, of 111, Munition Cottages, Holbrook Lane, Coventry, informs us that he is willing to correspond with anyone, especially manufacturers, interested in his invention, described in our issue of January 17th, primarily with the idea of launching it on the market.

Census of Tyres.

Which is the most popular tyre amongst Australian motorists? An accurate answer to this oft-discussed question was provided by the great collection of cars paddocked on Melbourne Cup Day, a census of the tyres fitted revealing the fact that the Dunlop easily carried off the honour. Altogether 3,324 tyres were checked, and of this total 1,538 were Dunlops, the balance being spread over thirty other different makes.

An Attractive Sidecar List.

We have received an interesting advance leaflet of Phœnix sidecars from the makers, the Phœnix Sidecar Works, Holloway, London, N. This leaflet is about 20in. × 10in., and contains full illustrations and specifications, together with prices, of the various sidecar productions emanating from the Phœnix Sidecar Works. Many of the models are of extremely pleasing design, and all such accessories as various types of hoods and screens are fully illustrated. There are two of these leaflets, one containing illustrations of complete sidecars, the other of sidecar bodies and fittings alone. Readers should state which they require when applying. It is also interesting to know that the makers hold a very large stock of sidecars, and are in a position to supply them.

The Welding of Metals.

There is an interesting article in the current issue of *System*, the business magazine, entitled "Recreating War-worn Machinery," by Mr. C. W. Brett, managing director and general manager of Messrs. Barimar, Ltd. It is not generally known among motor cyclists that Mr. Brett first began business with Werner Motors, when they had a depot in the very early days of the movement just off Regent Street.

The firm of Barimar has had a very fine record during the war, and has brought back into commission more than 20,000 fractured machines now engaged in work of national importance.

The article gives a full account of the interesting processes of electrical and oxy-acetylene welding, and also refers to the Thermit process, which was invented by a London metallurgist who disposed of his rights to a German. The process has now been taken up by Messrs. Barimar with great success.

The Palmer Tyre Calendars.

The Palmer Tyre, Ltd., 119-123, Shaftesbury Avenue, London, W.C.2, inform us that owing to the paper restrictions they are unable to reprint the Palmer calendar, the stock of which has entirely run out.

Repairs to Dixie and Splitdorf Magnetos.

Repairs or spare parts of Dixie and Splitdorf magnetos can be quickly furnished by the direct factory representatives, the American Supplies Co., Ltd., of 162, Great Portland Street, W.1.

English Motor Cycles for U.S. Army.

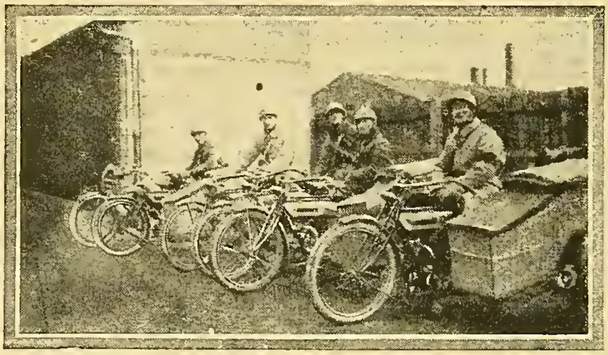
A considerable number of New Imperial 8 h.p. motor cycles have been ordered for the U.S. Army for use in France, and numbers have been already despatched. Also an order has been placed for New Imperial 8 h.p. machines by the Royal Naval Air Service.

Another Advance in Prices.

H. Miller and Co., Ltd., Miller Street, Birmingham, the manufacturers of the Miller Lightgivers, regret that, owing to the continual rise in cost of raw materials and labour, an entire revision of their selling prices has become necessary.

Parkside Reorganisation.

We are informed by the Parkside Motor Engineering Co., Ltd., Parkside Works, 28½, Sheen Lane, East Sheen, London, S.W.14, that the company will in future be known as the Nowell and Cox Engineering Co., Ltd. The new company, with a capital of £10,000, has taken over the whole of the works from the former company. Mr. Douglas Cox, who has had fifteen years' motor engineering experience, will assume the position of managing director, while Mr. W. J. Nowell will remain general manager.



Group of motor cyclists in the French Army with their Triumphs. The wicker sidecar is a feature distinctive to the French Army. It is used chiefly in the Commissariat Department.

Gas Filling.

We are informed by Messrs. Dews and Dyson, Town Hall Buildings, Brighouse, Yorkshire, that at their new premises at Police Street, in that town, they have installed a 100 light meter, and they are therefore now able to fill gasbags of any capacity in as short a time as possible. A meter of this size should effect a saving in time.

Buying a Tank.

The employees and managers of tl Metropolitan Carriage, Wagon, an Finance Co., Birmingham, have decide to purchase a Tank in the name of tl firm, and present it to the Army.

J. B. Brooks and Co., Ltd.

Although the company's resources a very considerable, and its facilities make are second to none in the trad it wishes to make it quite clear th orders given to travellers for forwa deliveries can only be accepted on tl terms that they are invoiced at the pri at which they can be manufactured the date of despatch.

With the coming of the new Ma and Woman-power Scheme it is ve difficult to know what the future has store, but the reputation of Messr Brooks and Co., Ltd., added to a car ful regard for after-the-war busines will be a guarantee that customers w continue to be as well served as possible.

Middlesex Motor Volunteers.

The motor cyclists attached to tl Heavy Transport Section of the Coun of Middlesex Motor Volunteers (Easte Group) have been recruited entirely fro the ranks of Harley-Davidson riders.

A series of lectures and demonstr tions on the Harley-Davidson mot cycle has been arranged for the bene of the motor cycle members in additi to the drills and parades.

There are at present vacancies f three motor cyclists, and any Harle Davidson rider resident in the Lond area who is interested should commu cate with Sec.-Lt. J. A. Masters, 7 Newman Street, London, W.1.

Birmingham Tank Bank.

One of the first and most encouragi contributions to the Tank Bank Birmingham when it opened on Decemb 31st was one from the employe of the B.S.A. Co. for £77,50 which had been subscribed f the purchase of 100,000 W Savings Certificates, making total of £205,000 invested War Loans by the B.S.A. wor people. The B.S.A. directo have set a fine example enabling their employees invest in War Loans, by pu chasing a large amount a allowing the employees to p off the amounts out of wage If all employers would car out a similar scheme, it wou mean that even in the four year of the war record sum would be subscribed. Th B.S.A. Co. have subscrib £300,000 through the Birmin ham Tank Bank, and the example has been widely copie

A New Depot.

The New Rover Cycle Co., Ltd., Co entry, inform us that they have mov their London depot from 19, Holbo Viaduct, London, E.C.1, to No. 18, account of the expiration of the leas The new premises, we are given understand, are more commodious a convenient.

To Motor Cyclists!

Get the very best out of your bike by fitting a

C.A.V. ALL BRITISH MAGNETO

All the world knows what our Dispatch Riders at the Front have done and are doing—and by far the greater number of machines used by them are C.A.V. equipped

C.A.Vandervell & Co. Ltd.
ACTON. LONDON. W.
Birmingham. Manchester.

Members of
The British Ignition
Apparatus Association

Bowden Wire Ltd.

TRADE MARK

LONDON

BEING wholly engaged upon production for the British and Allied Governments, we regret that we are unable for the present to execute any orders for private purposes.

Victoria Road, Willesden Junction,
N.W.10.
Established 1897

Godbold

You know what a new cover costs

—a Beldam Retread costs from 15/6 Most Beldam Retreads are good for 5,000 miles. 5,000 extra miles for 15/-!

Send old cover to us before it is too far gone, and we will quote cost of retread or repairs.

Booklet "Testimony"—post free—gives experiences of users of Beldam Tyres and Retreads.

The BELDAM TYRE CO., LTD.,
Brentford——Middlesex.

Beldam Retreads

Godbolds.

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns—First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller. but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. Spares; prompt delivery.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

A.J.S., 6h.p., latest model in stock.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [X1662

A.J.S., 1914, 2-speed, clutch, and K.S., all-chain drive, £37/15; 1913 model, £35; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1698

A.J.S. Motor Cycles.—Immediate delivery of the very latest 6h.p. models from stock.—The A.J.S. Specialists, The Walsall Garage, Walsall. Tel.: 444. [X9872

6h.p. A.J.S., 3-speed gear box, kick, coach sidecar, overhauled, new tyres, 650×65; nearest to £50; petrol, oil, carbide.—F.G., 20, Northlands St., Camberwell, S.E.5. [3279

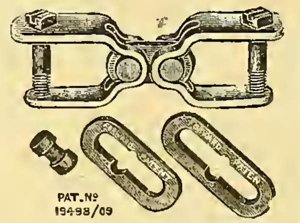
A.J.S. Motor Cycles.—Immediate delivery of special 1917 model, complete, detachable wheels, 700×80 tyres; £91/6; trade supplied; no permits required.—P. J. Evans, Sole Agent for Birmingham and district. [X0652

A.J.S., 6h.p., and sidecar, with wind screen, lamp, and horn; this is one of the latest 1915 models turned out, as it left the works in October, 1915. The outfit has been thoroughly overhauled and revarnished, and is practically equal to new in every possible respect; price only 80 gns.—Julian, 84, Broad St., Reading. Biggest light car and motor cycle dealer in the South. 'Phone: 1024. Closed Wednesdays 1 o'clock. [0735

A Good Belt and a Good Fastener.

If a poor belt is fastened by a good fastener the latter may effect its purpose perfectly, but it can never overcome the belt's deficiencies.

On the other hand, if a good belt is fastened with a poor fastener all the "goodness" of the former counts for nought.



THE FORWARD, 1/6.

THE FORWARD will always do its work effectively; it is "the fastener that never fails."

It is worthy of the finest belt produced—yours, for instance—and its merits ensure long life and perfect service.

There are several models—we illustrate the Forward—but don't forget the KING HOOK, "King of all hook fasteners." **1/-** detachable, **1/3** adjustable.

FORWARD MOTOR CO.,
Forward Works, Summer Row,
BIRMINGHAM.

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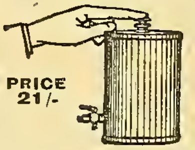
THE EUK EASY STARTER

PRICE 21/-



KEEPS MACHINES READY TO RIDE.

Only needs a touch, and it gives perfect instant easy starting, no matter how long it has been out of use. Always satisfactory. Never fails. Over 33,000 users praise it. So will you. Details free from—

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MOTOR CYCLES FOR SALE.

A.J.S.

1917 A.J.S., 2¾h.p., 3-speed, hand clutch, l model, very economical; bargain, £44.- Moulds, 39, Greenholm Rd., Eltham, Kent. [

Alldays.

ALLON.—All new models; E.P. or exchenge.—Se Co., 292, High Holborn, W.C.1. [X

ALLONS, new 2½h.p. 2-stroke models, 2-speed g 40 gns.; extended payments, or exchanges.—V chope's, 9, Shoe Lane, London. [

ALLDAYS 2-stroke Motor Cycle; £16/10; se owing to owner been joined up nearly three y —Apply to Blanshard, Keadby, Doncaster. [

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-s countershaft models in stock. [

ARIEL, 1917, 3½h.p., 3 speeds, countershaft, bined hand and foot clutch, lamps, horn, as bargain, £56.—Hook, High St., St. Mary Cray, [

GENUINE Bargain; good opportunity occurs.—B new 3½h.p. Ariel combination, complete, £95/11 September last, not done 100 miles; owner able to use same; accept £90 nett cash; will a dealers a commission.—Box 1,657, c/o *The Motor C* [X1

ARIEL Coachbuilt Combination; this machin late 1915, 3½h.p., 3-speed countershaft, starter, decompressor, hand and foot clutch, condi as new, fitted complete, sidecar is Gloria No. 1a, sporty body, mileage under 2,500; price £65; secti shed, £5. I want a cheaper and lighter single, or t solo mount, with T.T. bars, N.U.T., Bat, Brough A.J.S.—McFarlane, 295, Edge Lane, Droylsden, chester. [

Bat.

1913 6h.p. Bat-Jap Combination, 3-speed, kick s perfect order; 32 gns.—Fox, Irchester. [3

6h.p. Bat, 1915, twin-cyl. J.A.P. engine, 2-speed g round tank, chain-cum-belt; £45.—Seen at V chope's, 9, Shoe Lane, London, [3

85×65 Bat-Jap, o.h. valves, Bowden 2-speed, engine, K.S., hand and foot control, Bo Cowey, Binks, horn, excellent condition, just overhauled, painted red; £45, bargain.—Wilson, Cozens, Pinewood Av., Crowthorne, Berks. [3

Bradbury.

BRADBURY, 1912-13 3½h.p., 3 speeds, and co built sidecar; £35/10.—Motor Exchange, Ho St., Halifax. [3

BRADBURY 4h.p. 1913 Combination, sporting fit, perfect order, as new; £24.—88, Asylum Peckham, S.E. [3

BRADBURY 1914 4h.p. Combination, 2-speed, fect condition; £30.—Shadrick, 102, Grove V E. Dulwich, S.E. [X1

Brough.

1916 Brough 3½h.p. Horizontally Opposed Twin speed Sturmey-Archer countershaft, lamps, h very good condition; £55.—Elce and Co., 15-16, Bish gate Av., Camomile St., E.C.3. [0

BROUGH 1916 Model, 2-speed, including lamp; gns.; this machine is one of the greatest barg offered.—Julian, 84, Broad St., Reading. Biggest li car and motor cycle dealer in the South. 'Pho 1024. Closed Wednesdays 1 o'clock. [0

BROUGH, 1916, 3½h.p. horizontal twin, 3-sp Sturmey-Archer countershaft gear, semi T.T. b King of the Road lamp, Spartan warning signal, k grips, Dunlop tyres, but little used and carefu £57/10.—Seen at Wauchope's, 9, Shoe Lane, Lond [3

Brown.

BROWN, good condition, accumulator ignition, back tyres, wants slight adjusting; £3/1 Crocker, 30, Kirkstall Av., Phillip Lane, Tottenham, [X1

B.S.A.

B.S.A., late 1915, 4¼h.p., countershaft 3-speed, starter, tyres in excellent condition, one ridden very little, perfect running order; 45 gn Lt.-Colonel W. B. Brittain, The Castle, Dover. [3

1915 B.S.A. and Sidecar, 3-speed, kick starter, cludes handsome coachbuilt sidecar, speedome lamps, tools, storm apron, spare petrol tank; barg at £55 the combination complete.—Wauchope's, Shoe Lane, London. [3

Calcott

DIRT Cheap.—Calcott lightweight, about 1914 complete with lamps, horn, etc., clutch model, cellent order, go anywhere; £13/10 for immediate s —Webster, Square, Kenilworth. [X1

Calthorpe.

CALTHORPE-J.A.P., 1916 model, 2-speed, sp ometer, 3-note horn, head lamp, generator, lamp, Dunlop studded tyres, as new throughout; gain, £30.—Menes and Mebes, 154-6, Gt. Portland W.1. Tel.: 3426 Mayfair. [3

MOTOR CYCLES FOR SALE.

Calthorpe.

LTHORPE, 1916, 2¾h.p., 2-stroke, Albion 2-speed, free engine; £30, no offers. 37, Wingfield td Walthamstow. [3295

LTHORPE, 1916, 2¾h.p., 2-stroke, Albion 2-speed and free engine; £28.—30, Church Rd., gate Rd., Hackney. [3296

LTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits eq'ed.—P. J. Evans, 91, John Bright St., Birming- ar [X0654

LTHORPE-J.A.P., late 1915, Enfield 2-speed gear, free engine, lamps, horn, tyres in excellent condi- thoroughly overhauled; £20, bargain.—Pugh, High t. Holywell. [X1636

LTHORPE-J.A.P., late 1916, 2¾h.p., Enfield 2-speed, good condition, little used, all accessories; by appointment; £26, or nearest.—Allen, 53, War- Rd., Banbury. [X1508

Campion.

MPION, 1917, 8h.p. J.A.P., 4-speed Jardine gear box, combination fully equipped, almost new; £85. cy and Co., 337, Euston Rd., London. [3348

Clyno.

YNO 1913-14 Combination, 5-6h.p., 3-speed, spare wheel, lamp set, Cowey speedometer, horn, etc., £59/10; extended payments or exchange.—Service 292, High Holborn, London, W.C.1. [X1688

h.p. Clyno Combination, 3-speed, detachable wheels, spare wheel and tyre, and all accessories, hood creen, reliable in every way; unprecedented bargain 65.—Wauchopes', 9, Shoe Lane, London. [3352

Douglas.

14½ 3½h.p. Douglas, 2-speed; what offers?—Shoda, Bellerby Terrace, West Hartlepool. [X1620

UGLAS.—Prompt delivery to these on work of national importance.—Gibb, Gloucester. [4749

UGLAS, 1915, 2¾h.p. W.D., in new condition; £45.—Apply, T. E. Davies, Pixley Court, Ledbury. [3258

14 Douglas, 2¾h.p., 2-speed, condition perfect; £26/10.—H. Wareing, 182, Portland St., South- [X1672

UGLAS, 1914, 2¾h.p., little used, fast, semi T.T., tip-top condition; what offers?—38, The Pippen, Wilts. [3256

UGLAS, 1913, 1914, and 1915 models in stock; prices from £26.—Percy and Co., 337, Euston London. [3347

UGLAS, 1912, 2-speed, new cyls., rings, etc., good condition; £21, approval.—Gibb, Worcester Gloucester. [X1486

UGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat il. Tel.: 50. [5855

11 Douglas, perfect order, good tyres, and in first-class condition; first £10 gets bargain.—Box c/o *The Motor Cycle.* [X1656

p. Douglas, 2-speed, clutch, and kick starter, speedometer, mechanical horn; reasonable offers.—dribaye, 4, Napoleon Rd., Twickenham. [3306

UGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, Douglas agent, 196, Cheltenham Rd., Bristol. [0923

UGLAS, 1913, 2-speed, Bosch mag., £32/10; 1911 2¾h.p., with lamp and tools, £12/10; E.P. or nge.—Service Co., 292, High Holborn, W.C.1. [X1693

15 2¾h.p. Douglas, U. semi-T.T. bars, footboards, Amac carburetter, excellent order, lamp, horn, etc.; £35.—Robinson's Garage, Green St., Cam- ge. [3333

UGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions per- 1915 2-speed Douglas, £42/10.—Motor Exchange, ton St., Halifax. [3262

IDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1914 Douglas, 2¾h.p., 2-speed, clutch, start, 34 gns.; many Douglas parts in stock, in- ing complete engine. (D) [3387

17 2¾h.p. Douglas U, 3-speed, nearly new tyres, footboards, upturned bars, left works June, 1917, low mileage, perfect condition; £48.—Robinson's ge, Green St., Cambridge. [3334

17 2¾h.p. Douglas, Model W, hand-controlled clutch, kick start, latest improvements, £54, plus ; also Models U and V, 1916 specification, £50, 10%, absolutely new; immediate delivery against rity permits for doctors, farmers, war and muni workers; how and where to apply.—Full particulars. e, Douglas Specialists, Robinson's Garage, Green St., bridge. [3332

Edmund.

MUND 1916 Combination, 4h.p. twin, 2-speed, start; dirt cheap, £45; exchange.—23, William Barking. [3240

p. Edmund 1915 Combination, superb lot, very comfortable, reliable; £45.—Palmer's Garage, Toot- Exchanges. [3309

Enfield.

NFIELD 1916 6h.p. Combination; offers, or exchange.—Call only, 29, St. Leonard's St., Bow lge [3325

GET IT AT

Taylor's

We invite enquiries from
MOTOR VOLUNTEERS, ARMY, NAVY, DOCTORS, COMMERCIALS, Etc.,
who require absolutely reliable Machines.
Payment out of Income if desired.

1918 6 h.p. **A.J.S.** Combination, screen, and Sidecar, new	£116 0
1917 7-9 h.p. **J HARLEY - DAVIDSON** Combination, electric equipment, speedometer, clock, etc., in very fine condition	£112 10
1916 7-9 h.p. **J HARLEY - DAVIDSON,** electric equipment, coachbuilt Sidecar; machine run only 500 miles	£85 0
1916 6 h.p. **A.J.S.,** 3-sp., kick-starter, spring seat pillar, guaranteed	£73 10
1915 6 h.p. **BRADBURY,** 3-sp., kick-start, and cigar-shape Sidecar	£60 0
1916 4 h.p. **A.J.S.** Combination, with spare wheel and tyre	£75 0
1917 2¾ h.p. **EXCELSIOR,** 2-str., 2-sp.	£44 2
1917 2½ h.p. **EXCELSIOR-J.A.P.,** 2-sp.	£48 10
1917 2¾ h.p. **CALTHORPE-J.A.P.,** 2-sp.; cost £39 18s.; soiled only	£35 10

Sole London Agents for **A.J.S.** and **EXCELSIORS.**
Sole District Agents for **CALTHORPES.**

H. TAYLOR & CO., LTD.

Showrooms: 21a, STORE STREET, W.C.1.
Wholesale: 38, ALFRED PLACE, W.C.1.
Garage: Tottenham Mews. 'Phone—Museum, 1210
Telegrams—"Dynametro, Westcent, London."

MOTOR CYCLES FOR SALE.

Enfield.

ENFIELD 1916 6h.p. Combination, well equipped excellent order; 79 gns.—Motor Exchange, Horton St., Halifax. [3264

ENFIELD 6h.p. Combination, 1916, equal to new, date and condition guaranteed; 70 gns.—280, Camberwell Rd., S.E.5. [3294

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Enfield, 1915, 3h.p. twin, 2-speed, clutch, kick-start, 33 gns.; also two Enfield combinations. (D) [3377

ENFIELD, late 1915, 3h.p. twin, and lightweight O.B sidecar, £42/15; 1915 6h.p. combination, £76; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1699

1915 3h.p. Enfield Twin, all-chain drive, 2-speed, and kick start, 120 m.p.g., new head lamp and footboards, speedometer, mechanical horn; £33; trial willingly.—Kennedy, Woodville, Hills Rd., Cambridge. [X1603

ENFIELD, 1913, 2¾h.p. twin, 2-speed, Bosch, Senspray, lamps, Stewart warning signal, tyres good, splendid condition, very little used since 1914; £26; seen by appointment.—Wigner, 15, Admiralty Terrace, Upnor, near Rochester, Kent. [3280

ENFIELD 6h.p. 2-speed Combination, late 1914, very little used, lamps, tools, etc., light car Stelastic tyre on back, all tyres like new, mechanically the machine is perfect; real bargain, £58.—Engineer, Pinewood Sanatorium, Wokingham, Berks. [X1707

ENFIELD 1916 6h.p. Combination, hood, screen, Lucas dynamo lighting, with full lamp equipment and inspection lamp, electric horn, and gas equipment, in addition to petrol; 93 gns., or exchange for Grand Prix Morgan.—22, Coleridge St., Halifax. [3265

ENFIELD Motor Cycle (1915), 3½h.p. twin, as new, 2 speeds, fitted Palmer cord tyres, Stewart speedometer, P. and H. head lamps and generator, rear lamp and accessories.—Apply, North Finchley Motor Co., 15, Woodhouse Parade, High Rd., North Finchley, N. [3249

HAVING Acquired the entire stock-in-trade of the N.S.U. Motor Co., Ltd., we can supply spares for practically all types of N.S.U. motor cycles. In ordering it is important to submit old parts as patterns. —Eagles and Co., Acton Hill Works, Acton, W.3. [X1654

ENFIELD Combination, late 1916, 6h.p., with Lucas dynamo lighting set; this machine has been very little ridden, and is in beautiful condition, just like brand new throughout, ideal reliable all-weather business combination; price £88.—20, Hope St., West Bromwich, Staffs. [X1652

MOTOR CYCLES FOR SALE.

F.N.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1913 F.N., 5-6h.p., 2-speed; 26 gns (D) [3386

5-6h.p. 4-cyl. F.N., B. and B., Bosch, new condition throughout; £17, absolute bargain.—Nelson, 470, Wandsworth Rd., S.W. [3328

Harley-Davidson.

1917 Harley-Davidson Combination, dynamo lighting, coach sidecar; £130; exchanges entertained.—Mitchell's Garage, Roundhay Rd., Leeds. [X1156

7-9h.p. Harley-Davidson 1915 Electrically Equipped Combination, hood, screen, and all accessories; £65.—Seen at Wauchope's, 9, Shoe Lane, London. [3356

HARLEY-DAVIDSON, olive green electric model, speedometer, absolutely new condition throughout, only run few miles; £95.—Box L5,497, c/o *The Motor Cycle.* [3094

MUST Sell.—Harley-Davidson combination, in new condition, £75; also a 1913 Girling Autocarrier, in good running order, £45.—Beaumont, 59, Halstead Rd., Enfield. [3259

HARLEY-DAVIDSON Combination 1915, electrically equipped, aluminium disc wheels all round, hood and screen, etc.; £75; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1686

HARLEY-DAVIDSON Combination, 1916 model, bought new July, 1917, only done 500 miles; owner bought car; perfect condition, complete; £80, no offers; seen any time; cost £112.—Shaw, Springstone, Ossett, Yorks. (D) [X1510

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Harley-Davidson, 1915, dynamo lighting, underslung sidecar, luggage and petrol grids, wind screen, etc., 62 gns.; T.T. Harley, 7-9h.p., 3-speed, disc wheels, olive green finish, 63 gns. (D) [3392

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1695

Henderson.

RIDER TROWARD and Co., 31 and 78, High St., Hampstead.—1915 Henderson combination, disc wheels, smart turnout; 76 gns. (D) [3384

Humber.

3½h.p. Humber, T.T., good order; sacrifice £12; consider 3-speed cycle or mechanic's tools as part exchange.—Bungalow Cottage, Marton, Yorks. [X1666

2-SPEED Humber and nice sidecar, bought new by present owner, free engine, spares, tyres nearly new; exceptional bargain, £25.—12, Barrington Rd., Hornsey, N.8. [3307

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1918 Humber, 6h.p., 3-speed gear box, water-cooled horizontally opposed twin, Montgomery sidecar, 95 gns.; 1914 Humber, 3½h.p., 3-speed, underslung sidecar, 37 gns.; 1913 Humber, 3-speed, coach sidecar, 29 gns.; 1912 Humber, 3½h.p., 2-speed, 22 gns. (D) [3385

Indian.

6h.p. Blue Indian, F.E., chain drive; £20.—Talmore, Bury St. Edmunds. [3337

INDIAN, 1915, 5h.p., 3 speeds, fully equipped, equals new, run 500 miles only; £50.—Below.

INDIAN 1914 7-9h.p. 2-speed Combination, electric equipment, in real nice condition throughout; £36.—Percy and Co., 337, Euston Rd., London. [3338

INDIAN, 1912, 4h.p., 2 speeds, £22/10; 1912, 7-9h.p., single speed, £27/10.—Motor Exchange, Horton St., Halifax. [3266

7-9h.p. Indian, 1914, with 25 gn. sidecar, hood, screen, electric lighting, horns, speedometer, spring frame, excellent condition; 48 gns.—5, Roseland Terrace, Upperby, Carlisle. [X1635

1915 7-9h.p. Hendee Special Indian Combination, electric model, and starter, Millford sidecar, rear driven speedometer, 2-speed, and clutch; offers, or exchange.—Crown Engineering Co., Tipton. [X1637

1915 Indian, 7-9h.p., 3-speed, clutch, £40; Mills-Fulford Indian latest type coachbuilt sidecar, locker in rear, hood, screen, luggage carrier, nearly new, £12; electric lighting set and battery to suit above, 50/-.—Clapham (Motors), King George St., Greenwich. [X1653

1915 Racing Clutch Model 7-9h.p. Indian, enamelled grey, fitted speedometer, mechanical horn, and lamps, mechanical condition like new, mileage under 2,500; highest cash offer accepted; bike honestly worth £45; stamp for reply.—A. Whale, 47, Alexandra Rd., N.W.8. [X1601

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Indian, 1915, 7-9h.p., 3-speed, electric lighting, coach sidecar, 57 gns.; Indian, 1914, 7-9 h.p., 2-speed, coach sidecar, spring frame, 42 gns., Indian, 1916, T.T., 7-9h.p., clutch, 39 gns.; 1915 ditto, disc wheels, 37 gns.; 1914 7-9h.p. Indian, 2-speed, spring frame, 34 gns.; 1914 T.T. 7-9h.p. Indian, clutch, 29 gns.; also many Indian parts and several Indian sidecars. (D) [3388

MOTOR CYCLES FOR SALE.

James.

JAMES 1916 Combination, 3 lamps, Jones, tools, first-class turnout, 3,000 miles, tyres good; £70.—H. Moore, Hawes. [3233

JAMES, all models, new and second-hand; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1687

1916 4¼h.p. James Combination, as new, run 500 miles; sell £70, or would consider Douglas in part exchange.—W. Shaw, 13, Chester St., Barrow-in-Furness. [X1616

Kerry.

KERRY 5-6h.p. Twin, Bosch, Druids, free engine, faultless; £16/10, bargain.—Stocker, Millmead Villas, Auckland Terrace, Kingston-on-Thames. [X1631

Levis

2h.p. Popular Levis, guaranteed, includes accessories; £20, bargain.—Wauchope's, 9, Shoe Lane, London. [3358

Lea-Francis.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Lea-Francis, 1915, 3½h.p. twin J.A.P., countershaft gears; 48 gns. (D) [3376

Lincoln-Elk.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Lincoln Elk, 1913, 3½h.p., variable gear, waterproof Bosch mag., with good sidecar, 23 gns. (D) [3383

M.A.G.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1916 M.A.G., 3½h.p. twin, 2-speed, clutch, kick-start, 45 gns.; ditto, 1915, 42 gns.; good coach sidecar to fit, 7 gns. (D) [3382

Matchless.

MATCHLESS, 8h.p., 2 speeds, free engine, handle start, good condition; must sell; £35.—S. Savage, 9, Macdonald Rd., Forest Gate, E.7. [3326

7h.p. Matchless Sidecar Outfit, complete with all accessories, M.A.G. engine; offers wanted; inspection at any time.—Grose, Ltd., Marefair, Northampton. [X1641

MATCHLESS 8h.p. Combination, new, fitted with J.A.P. or M.A.G. engines; extended payments or exchanges.—Service Co., 292, High Holborn, London, W.C.1. [X1689

Minerva.

3½h.p. Minerva, B. and B., new tyres, belt, new condition throughout; £7.—Nelson, 470 Wandsworth Rd., S.W. [3329

New Hudson.

NEW Hudson Coach Combination, 1914, 3 speeds, smart; sacrifice £35, offer, exchange.—18, Gowlett Rd., Peckham. [3311

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—New Hudson, 2-stroke, 2-speed, 1916, 25 gns.; 1915 4h.p. coach combination, 3-speed, chain-cum-belt, 37 gns.; 1915 6h.p. coach combination, 3-speed, chain-cum-belt, 52 gns. (D) [3381

New Imperial.

CROW Bros., Guildford.—New Imperial, latest 2½h.p., 3½h.p., 6h.p. models in stock· also sound second-hands. [1047

IMPERIAL-J.A.P., 2-speed, clutch model, £32/10; also new models in stock; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1691

NEW Imperial Motor Cycles, 2 speeds, clutch and kick starter, and lady's models in stock for immediate delivery; trade supplied; no permits required. —P. J. Evans, 91. John Bright St., Birmingham. [X0655

1917 New Imperial-Jap, 2¾h.p., 2-speed, clutch, kick starter, speedometer, lamps, horn, tools, decompressor, special saddle, only been 400 miles, perfect condition; cost over £56, accept £38; approval.—Box 1,662, c/o *The Motor Cycle.* [X1649

Norton.

NORTON 1918 Special Military Model, brand new, actually in stock for immediate delivery; £82/10. —Below.

NORTON 1916 Big Four Combination, in exceptional condition; £70.—Percy and Co., 337, Euston Rd., London. [3345

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.1916 T.T. Norton, perfect, 48 gns.; also 1915 Norton, 37 gns. (D) [3378

NORTON.—Big 4 Military Model, all-chain, new; also chain-cum-belt; £57/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1696

NORTON Big Four, 1914, and Watsonian coachbuilt sidecar, just overhauled and rebushed, Sturmey 3-speed gear overhauled by makers, new mudguards and carrier, practically new tyres and belt, many spares, including belt and tyre, complete with lamps, mechanical horn, and tools; £40.—Arthur, Angel Hotel, Grantham. [X1671

N.S.U.

N.S.U., 3½h.p., 2 speeds, coachbuilt sidecar, in real good running order; £14/10.—Percy and Co., 337, Euston Rd., London. [3344

N.U.T.

LATEST Model N.U.T., 3½-4h.p., free engine, 3 speeds, kick start, J.A.P. engine, like new; £40, complete.—Miller, 62, Hampstead Rd., N.W. [3147

Rider Troward & Co

We now find that, owing to the extent of our Stock, which numbers **200** Machines and Light Cars, we cannot list them every week. Accordingly, this week we give a selection of Sidecar Combinations; next week, Solo Machines; the following week, Two-strokes, etc. If what you require is not below, write for full list. Bear in mind that any machine can be purchased at a quarter down, balance by instalments to suit purchaser; stored free till required. For those in the Services we would say that death or injury cancels the transaction.

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NEW HUDSON,	1915, 4 h.p., 3-sp., c. Sidecar	**37 gns.**
PREMIER,	1916, 3-speed, coach Sidecar ..	**52 gns.**
PREMIER,	1915, 3-speed, coach Sidecar ...	**45 gns.**
PREMIER,	1914, 3-speed, coach Sidecar ..	**37 gns.**
RUDGE-MULTI,	1916, Millford Corvette Sc.	**52 gns.**
RUDGE-MULTI,	1914, 5-6 h.p., Sporting Sc.	**39 gns.**
RUDGE-MULTI,	1914, 3½ h.p., coach Sidecar	**34 gns.**
SCOTT,	1915, 3¾ h.p., 2-speed, coach Sidecar	**48 gns.**
SCOTT,	1913, 3¾ h.p., 2-spd., Turner c. S/car	**29 gns.**
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O.K. Juniors.—Call and inspect at the N.W. district agent, F. J. Youngs, 2-3, The Parade, Kilburn. [0910

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P. and M., 3½h.p., 2 speeds and sidecar, underslung chassis; £22/10.—Motor Exchange, Horton St., Halifax. [3268

P. and M., 1914, 2 speeds, kick starter, decompressor, lamps, speedometer, and sidecar; £34.—Cooper, 47, Blackhorse Lane, Addiscombe, Croydon. [3322

Premier.

PREMIER, 1914, 3½h.p., 3-speed, clutch, and K.S., Stewart speedometer, lamp, and horn, £34/15; 1916 combination, £61/15; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1682

PREMIER Twin, 1911, 4h.p., 90°, mileage about 5,000, mechanically perfect, Simms mag.; £15, or nearest; sound condition.—Arm. St. Sergt. Critchley, 3rd West Yorks, Whitley Bay. [X1629

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1916 Premier 3-speed coachbuilt combination, 52 gns.; 1915 ditto, 47 gns.; 1914 ditto, 37 gns.; 1913 ditto, 34 gns.; 1911 T.T. Premier, disc wheels, 16 gns. [3380

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RADCO, 1915, 2½h.p., 2-stroke, as new; £20.—F. C. Coleman, 60, Calvert Rd., E. Greenwich, S.E.10. [3241

RADCO. 1915. 2-speed, 2-stroke, 2¼h.p., good appearance; £21/10.—Motor Exchange, Horton St., Halifax. [3267

RADCO, 1917, 2½h.p., 2-stroke, as new; £25; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1685

Rex.

1913 6h.p. Rex Combination, 2-speed, hood and screen, splendid turnout; 35 gns.—Talmore, Bury St. Edmunds. [3336

REX 5-6h.p. Combination, new Bosch, splendid condition throughout; owner killed; £12.—67, Wantage Rd., Reading [X1676

REX 1913 Combination, 5-6h.p., handle start, fully equipped, and in first-class condition, O.B. sidecar and delivery box; 35 gns., with one body only 30 gns.—Buntings, Masons Av., Harrow. [3408

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ROVER.—All new models supplied; E.P. or exchange. —Service Co., 292, High Holborn, London. [X1690

MOTOR CYCLES FOR SALE.

Rover.

3½h.p. Rover, free engine model, just been enam and overhauled; £20.—Larkin, Curberry, Ry [X1

1917 T.T. Rover, Philipson pulley, slightly s soiled; original price £67/10, reduced to 57 This machine is absolutely new—in fact, the en has never been started; this is a great bargain.

JULIANS, 84, Broad St., Reading. Biggest l car and motor cycle dealer in the South. 'Pho 1024. Closed Wednesday 1 o'clock. [X1

ROVER Motor Cycles, 3½h.p. and 5-6h.p. models stock for immediate delivery, both solo and s car outfits; trade supplied; no permits required.- J. Evans, 91, John Bright St., Birmingham. [X0

3½h.p. Rover Coachbuilt Combination, 3-speed, clu kick starter, Bosch weatherproof mag., L lamps, Stewart speedometer, hood, wind screen, lugg grid, nearly new tyres, in splendid condition; any tr £35.—E.S., 58, Malvern Rd., Dalston. [3

1917 Rover, T.T., Philipson; this machine is in tinguishable from new—in fact, it is in be condition than a new machine, only done 500 mi price 50 gns.—Julian, 84, Broad St., Reading. Big light car and motor cycle dealer in the South. 'Pho 1024. Closed Wednesdays 1 o'clock. [0

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ROYAL Ruby, 1917, 2½h.p. J.A.P. engine, with light Coronet sidecar, as new; sell, or excha for higher power, any good make.—Lassetter, Screm Spilsby. [3

Rudge.

RUDGE, I.O.M., 3½h.p., special fast machine, alm as new; £50.—Percy and Co., 337, Euston London. [3

1917 Rudge Multi and clutch, electric lighting, s T.T. bars, as new; £55.—Seen at Wauchop 9, Shoe Lane, London. [3

1914 Rudge Multi, 3½h.p., and Rudge coachb sidecar, lamps, horn, speedometer; bargain, £ —Elce and Co., 15-16, Bishopsgate Av., Camomile E.C.3. [0

RUDGE Multi, 1914, sidecar, electric lights, th oughly good order; owner leaving for Austral must sell; any reasonable offer.—Milford, Staff, Mo Video Camp, Weymouth. [X1

RIDER TROWARD and Co., 31, 40b, 78, High Hampstead.—Rudge Multi, 1917, as new, 47 gn Rudge Multi, 1916, coach sidecar, 52 gns.; Ru Multi, 1914, 5-6h.p., sporting sidecar, 39 gns.; Ru Multi, 1914, 3½h.p., coach sidecar, underslung, gns.; Rudge Multi, 1913, T.T., 27 gns.; Rudge, 19 T.T., Philipson, 23 gns.; also many Rudge parts. [33

Scott.

SCOTT, 1913, Bosch mag.; £37/10; 2-speed, clut and kick starter; E.P. or exchange.—Service 292, High Holborn, W.C.1. [X16

RIDER TROWARD and Co., 31 and 78, High Hampstead.—Scott 1915 coachbuilt combinati mileage 4,000, 48 gns.; 1913 Scott, Turner coachbu sidecar, 29 gns.; also many Scott parts. (D) [33

Sun.

LATE 1916 Sun-Villiers, 2-speed, as new, mile about 400, lamps, Stewart mechanical horn, D lop tyres, mudshields, etc.; cost £42, sacrifice £2 must sell this week; seen here any time.—98, Tu Hill, S.W.2. [33

Sunbeam.

SUNBEAM 1916 8h.p. M.A.G. Combination, alm new; £105.—Below.

SUNBEAM, 1917, 3½h.p., War Office Model, alm new; £105.—Percy and Co., 337, Euston R London. [33

1917 Sunbeam Combination, 3½h.p., perfect c dition, Lucas horn and lamps.—Turner, N borough, Leicester. [X16

RIDER TROWARD and Co., 31 and 78, High S Hampstead.—Sunbeam, 1916, 3½h.p., 3-spe perfect; 65 gns. (D) [33

1915 Sunbeam, 6h.p., Gloria sidecar, as new con tion, complete with accessories, very little use £80.—On view Swift Showrooms, Long Acre, Lond W.C. [32

SUNBEAM Combination, 1916, 8h.p., Lucas dyna lighting set, electric horn, speedometer, w screen, perfect condition, little used; £120; reasona offer considered.—Long, Thornhill, Wardle Rd., Sa Cheshire. [32

3½h.p. Sunbeam, 1916 model, complete with acc sories, fitted with genuine coachbuilt Sunbea sidecar, £87/10; also a 3½h.p. 1917 model, with eve accessory, and speedometer, £97/10; both machin are guaranteed mechanically sound, as new, and c be sold on easy terms or cash.—Wauchope's, 9, Sh Lane, London. [33

Swift.

SWIFT and C.B. Sidecar, 1915-16, 3½h.p., clutch, a K.S., complete with lamp and horn, splendid c dition; £49/10; E.P. or exchange.—Service Co., 29 High Holborn, London, W.C.1. [X16

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Motor Cyclists and the United Council.

THE United Council of Motor Users, Producers, and Distributers has been formed, and it appears to be for our readers to decide whether this new body shall receive the support of motor cyclists. Such support can be given through the Auto Cycle Union and through the Automobile Association. As regards the latter, assuming that the A.A. as a whole decides to participate, the motor cycling membership should certainly not be left without direct representation. At present, if rumours can be relied upon, the A.A. is holding aloof, which we think is a great pity. As regards the A.C.U., we have as yet no official information as to the attitude adopted.

The position of the A.C.U. is, in a sense, a somewhat difficult one. This is not a time at which a really representative general meeting can be called, or a plebiscite of the members taken with any certainty of arriving at the right result. This being so, one can well understand that the Committee may be reluctant to take any action which may appear to commit the members irrevocably to some policy which might not represent their real views.

At present the constitution of the Council is somewhat indefinite, but, nevertheless, certain main principles have been clearly adopted. One of these is that the user shall predominate in the Council, over the manufacturer or the distributer—in fact, over the two together. With this principle the motor cyclist must obviously be in agreement. He does not intend to be "run" by the Trade, but he presumably has no objection to the Trade lending its influence to support his own policy. Similarly, he can have no objection to collaborating on occasion with the motor car owner and the industrial vehicle user, provided that his interests are not subordinated to theirs. By such collaboration he may be able to avoid unseemly squabbles in public over matters of detail far better settled by compromise in private. He cannot, however, take any risk of being tongue-tied by any agreement to support a majority resolution of a body in which he has only a minority vote. To do this would be to render the A.C.U. impotent when its policy was out of agreement with that of, let us say, the Royal Automobile Club. As regards this point, one of the first stated principles of the new Council is that it will not take public action except as the consequence of a unanimous resolution. When unanimity proves impossible, the bodies forming the majority could, and probably would, forthwith form a joint committee to advocate their policy. The minority could take similar action, and would at least have the advantage of knowing exactly how matters stood, and what lay behind the exponents of the opposite point of view. If the A.C.U. supports the Council, then it has the power of preventing the Council, as such, from doing anything of which it disapproves.

What the whole thing comes to is, therefore, this. While the Committee cannot consult the membership as a whole, ought it to take steps to restrain the actions of the United Council or not? It seems to us that the governing body of the Union will not be doing its full duty to the membership if it neglects to take such steps. Were it to fail to do so, then, if the Council were to take public action evidently detrimental to motor cyclists, would not these latter have a legitimate grievance against the Union for having failed to protect them?

We should welcome the opinions of individuals on this question. Meanwhile, we believe that we are expressing the views of the majority of motor cyclists in advising that the A.C.U. should appoint delegates to the United Council, if only for the purpose of holding a watching brief, and not with a view to initiating action on lines that motor cyclists could conceivably regard as being open to controversy.

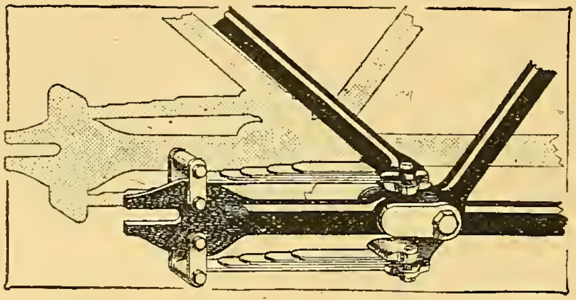
An Index to the advertisements in this issue will be found on the page facing the back cover

Another Rear-springing Arrangement.

A New Rear-springing System emanating from the Bat Works.

AMONG the many recent and promising arrangements of a rear-springing device is a patent by Mr. T. H. Tessier, of Bat fame. The Bat machine, of course, has been justly famous for years for the excellence of its springing systems, and anything new emanating from such a firm carries with it the hall-marks of quality and experience.

In its form as illustrated the device necessitates the use of four separate leaf springs. Briefly, the idea may be described as follows: The normal rear fork ends are replaced by special lugs carrying fork arms that are sprung, and at the ends of which is fitted the rear spindle of the wheel in the ordinary way. The two arms projecting from the lugs are able to swing round a pivot and are controlled in the extent of their movement by the action of the leaf springs.


A recent springing patent by T. H. Tessier, of the Bat Motors.

The Springs.

The actual number of the controlling springs may be varied if necessary either in so far as the number of their members—to determine their amount of elasticity—is concerned, or, instead of there being tw springs to each strut, there may be only one. Mor over, leaf springs may be replaced by springs c some other type, *e.g.*, the coil or helical type, thought desirable.

While the principles c construction involved in tl device seem to us to be qui sound, we must confess th the general appearance seen somewhat over-elaborate, an we should imagine that son of the parts would be liab to premature wear. One c the main advantages claime is the provision of a re springing without the loss c lateral rigidity, but we shoul be inclined to the criticis that, while lateral rigidit may have been retained, it has been so at the expens of flexibility in the springing. Perhaps the provisio of weaker springs or of a fewer number of sprin would remedy this, but we have no doubt that th designer has gone into the matter very thoroughl and that he has satisfied himself as to the capabiliti of his design before arriving at any such definite sta as that which the arrangement has now attained.

* * *

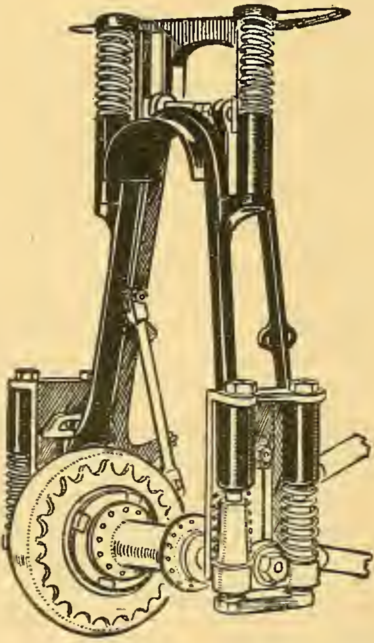
A Springing Device and Detachable Wheel.

An Invention that includes Simplicity in its many Good Features.

IT was in *The Motor Cycle* of March 23rd, 1916, page 274, that we described an extremely ingenious detachable wheel which was the invention of Mr. David Levy, 19, Drewstead Road, Streatham Hill, London, S.W. Mr. Levy has incorporated this invention in an excellent design for a rear-springing device which he has lately introduced. As the two are so closely connected, we reproduce the illustration of the detachable wheel and transmission shock absorber so as to remind our readers of its working.

Removal of the Wheel.

The simplicity with which the wheel is removed by undoing one nut and withdrawing the spindle, distance piece, and washer is quite remarkable. as is also the ingenious transmission shock absorber, consisting of a coil spring, one end of which is attached to the periphery of the brake drum and the other to the driving portion. In the event of the spring giving way or becon ing detached, dogs are provide which will allow the drive to b solid.


A detachable wheel and rear-springing device by Mr. D. Levy, Streatham Hill.

Springing.

As regards the rear sprin ing arrangement, the whole of th portion, consisting of the inner pa of forks which hold the wheel, i suspended on six coil springs, whic are partially, but, if desirable, ma be made entirely, enclosed. A sliding parts are provided with ampl bearing surfaces, and the slides i the top portion above the rear mu guard stay are provided wit means of adjustment so that th degree of friction in working ca be varied.

The whole idea is beautifull carried out, and should be we worth the attention of a manufa turer who has not yet decided upo any particular form of springin and most manufacturers should ha decided by now that some form c rear springing is advisable.

Occasional Comment

BY IXION

A Minor Difficulty.

T is quite probable that noisy valve gear will distinguish some of the earlier novelties in the way of hot-stuff engines. It is, of course, absurd fancy that the expansion of the cylinder under heat as been eliminated. The hoodoo which has been cotched is uneven expansion, better known as disortion. In the process even expansion has somemes risen to a larger percentage. Indeed, it is coneivable that if the tappets of a post-war hot-stuff otor cycle engine were adjusted to the correct learance when the engine was cold the clearance ould become excessive when the cylinder warmed up. hus it is on the cards that some of the early peace ngines will be designed to run with a tappet clearance hich will not make for silence.

The Composite Cylinder.

"ENGRO'S" article in the issue of February 7th was tantamount to a claim for the embodiment of aero engine practice in the motor ycle practice of the future. He practically suggests eparate combustion heads, and separate valve pockets, s alternatives to the single-casting method of construcion: and he only departed from aero engine practice n retaining the side valves, probably with the idea of educing overall height and providing plenty of tankge space without rendering the machine too high. s some readers have hinted that aero engine practice nvolves increased cost, it is interesting to notice that, o far as labour goes, the types of engine described y "Engro" would probably be cheaper than the ingle casting of pre-war days. Each item is extremely anageable, and the various machining jobs can mostly e done at a single mounting: by contrast, the old ype of 3½ h.p. cylinder is at once a complex casting nd a complex machining job, for both of which easons the percentage of duds was rather large, and arts often had to be scrapped on which a good many ours of labour had already been expended.

Two Flies in the Ointment.

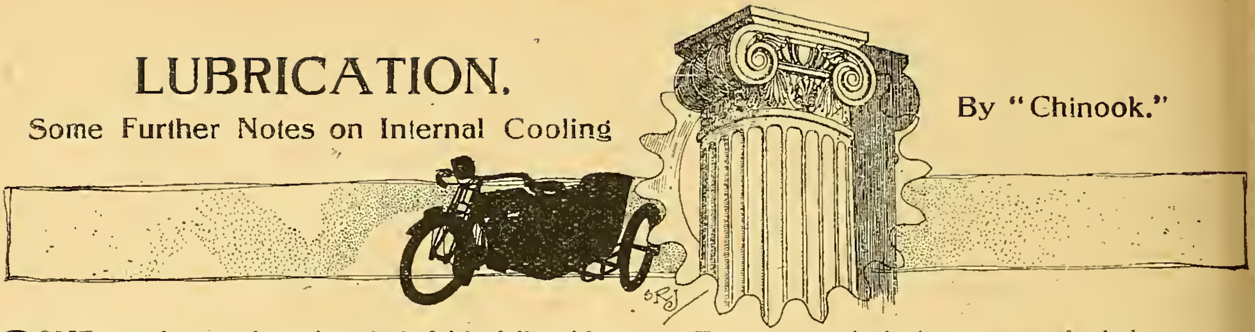
THE first potential hitch in such designs, as applied to motor cycle construction, is connected with the cost of metals. I presume that "Engro's" istons and bolted-on valve pockets are to be made f some aluminium alloy; what will aluminium cost fter the war, as compared with iron, or even with eel? The second turns upon even expansion under eat. His cylinder barrel is obviously a homogeneous, ell-balanced piece of work: as it gets hot, it will xpand evenly without distortion, especially if the bs are properly designed, and the exhaust valve is ocated at the rear (the hotter side), with the inlet at he front (the cooler side). Still, there will be a marked heat expansion in the combustion head, whether it is detachable or not. If this expansion is even, and no distortion occurs (which is a large order), what will happen to the bolted-on valve pockets? Can it be guaranteed that they will expand in the same ratio as the head, to which they are bolted? If they do not, we shall get the exhaust blowing at one pocket joint, whilst air leaks at the other will spoil our carburation. If the valves are seated in the pockets, this will affect the compression as well: but if the valve seatings are machined in the combustion head itself, the compression will probably be trustworthy.

In the Air v. on the Road.

IT is probable that many designers have solved all these problems in such practical aspects as flight presents. It remains to be proved that the extreme ranges of engine temperature encountered in the air and on the road are sufficiently parallel for one solution to fit both sets of circumstances. In flight an engine has to cope with a blazing summer sun at ground level and with positively Arctic temperatures up towards its ceiling. But the variation between these extremes is presumably narrower than the scale of heat and cold over which a motor cycle engine may range during quite a humdrum trip. After all, an aero engine is almost a fixed speed engine while it is at work: if its normal r.p.m. are, say, 1,250, its maximum revs. will possibly not exceed 1,500; and, again, it is guaranteed fairly stable atmospheric conditions. If its cooling is assisted by wind scoops, the speed of the wind into those scoops does not vary over a really wide margin, and the minimum speed is pretty high. If it is a rotary, and relies on its own breath, so to speak, the current which it creates is moderately stable. On the other hand, the motor bicycle engine is required to behave itself with technical propriety under a huge variety of conditions. It burbles along on a 4 to 1 gear with its throttle almost shut, or it bellows along on the same gear ratio at a mile a minute; again, it sometimes has to face a climb at a very low road speed, with the revs. mounting up towards 2,500 or even 3,000 on a gear of perhaps 12 to 1.

Patience.

PERSONALLY, I fully expect to see the aero engine paraphrased into a motor cycle engine ultimately. But I shall not be at all disappointed if some of the early peace engines closely resemble the pre-war engines. The two types of engine may prove to be less closely related than some of us fancy, and designers must not be blamed if they avoid headlong recklessness. I hope one or two of the best brains are almost ready to offer us the new type of engine, but if they are not we can wait.



LUBRICATION.

Some Further Notes on Internal Cooling

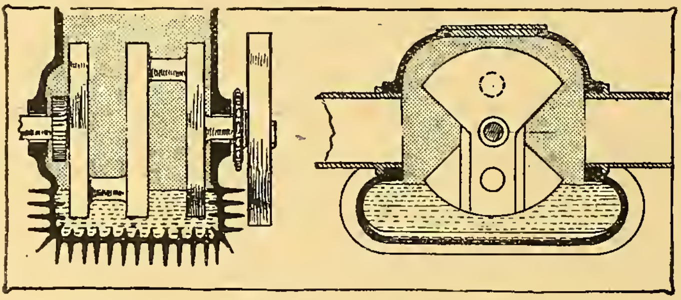
By "Chinook."

SOME months ago the writer dealt fairly fully with the subject of internal cooling as applied to the Maybach (Zeppelin) and various aero-engines of to-day—its desirable effect as regards lubrication, and the possibility of its application to motor cycle engines. Following the article came various suggestions from readers, some good, some unpractical, and others obviously impossible. The subject, however, is one so brimful of interest, and appears to have received so little attention from motor cycle engineers, that it may be worth while to review the proposition once again—though this time from a somewhat different standpoint.

One thing is certain—that engine design has reached a pitch where considerable revision as regards lubrication is essential. Hitherto we have been content to pump a predetermined quantity of oil into the crank case and allow it to stew there till the engine demanded a revivifying of the weakened supply, but with the high revving, highly efficient engines of to-day something better is required than this system of periodical cooling down the old and fatigued supply by a fresh charge. If we are to evade red-hot pistons and ensure longevity for the engine, then we must make sure that the oil in the crank case is always sufficiently fresh and cool to do its work.

Defects of Mechanical Lubrication.

A few days ago I was discussing the problem of lubrication with one of the most practical motor cycle engine designers of the day, but though on many points we agreed whole-heartedly, others brought forth a very natural diversity of opinion. One point of agreement was that mechanical lubrication, as employed on most American machines to-day, has not yet reached a point of perfection to warrant its general adoption by British manufacturers. The concurrent opinion was that, if a rider is too big an ass to be entrusted with the use of a hand pump, then assuredly the mechanical oil pump will prove beyond him. In both cases—though less so with the hand pump—he will alternatively starve and overoil his engine, and until mechanical lubrication reaches a pitch whereby the likelihood of error is much reduced, it has very little to recommend it.



A suggested design for an air-cooled oil sump of large capacity by means of which the oil would be prevented from attaining too high a temperature.

To quote a single instance set forth by my companion. His riding—done on an American machine with mechanical lubrication—is chiefly of the to and from home variety. One way it is all up hill, and the other all down, and he states that for weeks past he has been attempting to obtain that nicety of adjustment to suit the round trip. Once or twice he has very nearly hit the mark, then a change in the weather or a new brand of oil has upset his calculations and necessitated starting from the beginning again. The result is that he has now set the mechanical pump to feed a very small proportion of the oil necessary, and he makes up the deficiency by the use of the hand pump.

Visible Feed and Drying Up.

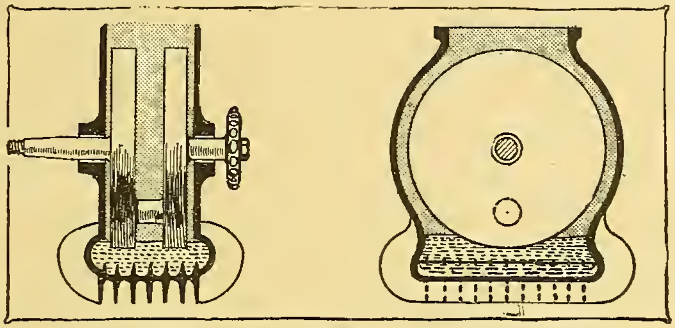
It would seem that the only mechanical system which recommends itself is one that has not yet been adopted, though the excellent system employed on the 3 h.p. Enfield comes very near it—namely, a system by which the oil from the pump passes through a sight feed in the tank, and is instantly adjustable by means of a screw, in the same manner as an ordinary drip feed. We should then be able to regulate the supply instantaneously and in exact accordance with immediate requirements, and on frosty mornings we should experience no qualms as to whether the engine was getting its proper supply. An ordinary hand pump would be incorporated, of course, for there is no doubt that an engine appreciates a periodical deluge of oil.

Let us for a moment, however, drop the subject of pumps. There are certain highly-efficient engines on the road that can be made to "dry up" even though flooded with oil. The necessary conditions are a long up grade, a following wind, and an open throttle. It is generally thought that an engine cannot "dry up" so long as there is sufficient oil in the crank case, but as a matter of fact I know of no small twin—especially among the "flats"—which will not give these results if new and slightly on the stiff side. It may take fully an hour's riding ere the critical period is reached, dependent on the fit of the pistons and the quality of the oil used, and this state of affairs proves one point pretty conclusively.

brication.—

is simply that the oil imprisoned in the crank case, bjected probably to a partial vacuum, has nothing do but to collect more and more heat till it attains temperature at which its viscosity is something akin that of paraffin—*i.e.*, it is too hot to lubricate, with e resultant “ drying up.”

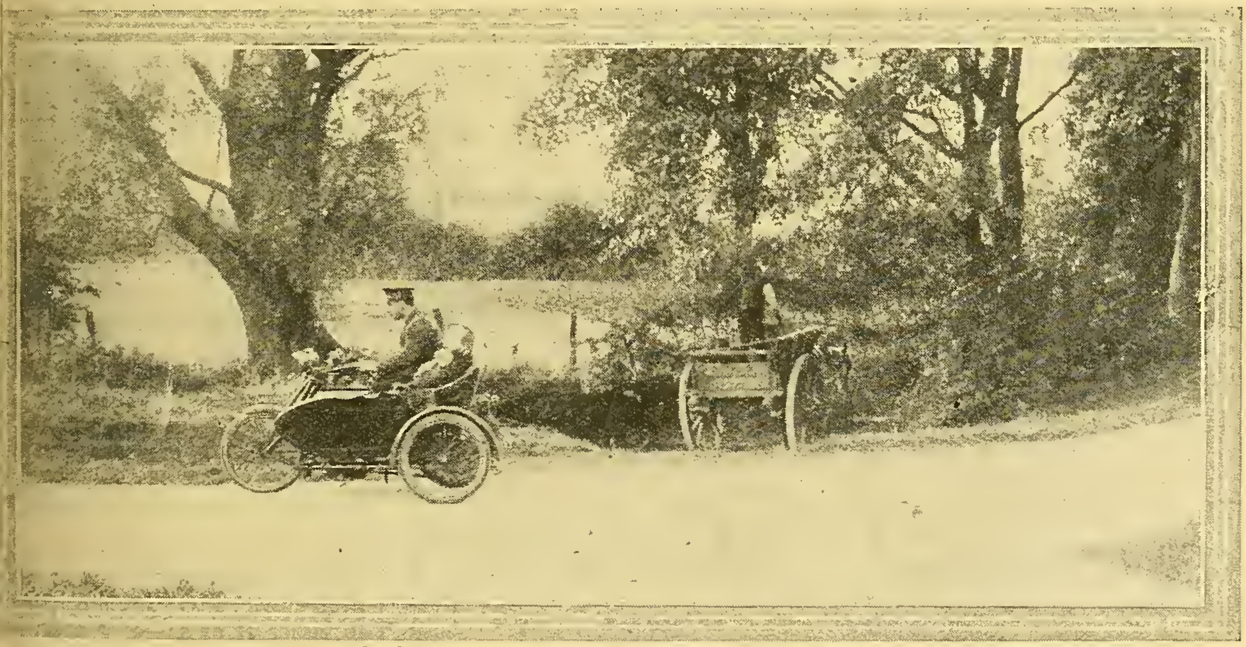
In the four-cylinder Henderson engine a half-arted attempt is made at retaining the crank case l at a moderately low temperature by the employ-ent of cooling fins on the crank case itself, and the enderson designer is to be complimented, if not for oroughly attaining his oject, at any rate for ving the heart for aking a pretence at it. e want the same thing a much larger and ore extensive scale. et us have good deep as into which the oil n gravitate, not only e outside of the sump, it also the inside being rrugated. If the gine can be internally oled, so much the tter, but at all events some attempt should at least made to cool the sump if the engine is to wear well d be economical in oil. In present-day design oil mps are usually of very limited capacity, and generlly their exterior is thickly caked with mud, which nders what little radiation might take place.



A sump of large size designed for an inside flywheel engine.

The capacity of the sump is an exceedingly imrtant point. By employing a sump of large pacity not only is the radiating surface naturally creased, but the reserve of oil permits indiscretions the manipulating of the supply which, with a small sump, at once lead either to drying up or a smoky exhaust. What I mean is that a single charge added to the contents of a sump already containing, say, one pint, makes little difference to the oil level, while with a small sump an equivalent dose might immediately mean a sooted plug; and similarly, having a large reserve, no harm is done if one inadvertently omits to give the desirable charge. Thus, having started the journey with the supply at the correct level, one can employ more or less haphazard methods for many miles to come.

Personally, I am all in for the hand pump, large, air-cooled sump, and mechanical pump for circulating and distributing the oil. The hand pump is the zenith of simplicity, and given oil sumps of sensible design there should be no difficulty in ascertaining that the oil is at the correct level before each journey, thus removing the objection of irregularity. It is particularly noticeable that machines provided with diminutive pumps are all of them ticklish as regards oiling, so it would seem that the first step is to redesign our crank case, after which half the difficulties of administering the oil will disappear—whether it be administered mechanically or by hand pump. In adopting these methods we should only be following approved design in car practice, and after all it can be borne in mind that the manner in which the oil is delivered to the engine is of little consequence compared with what is done with it when it gets there.



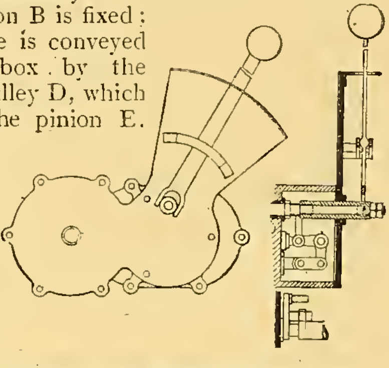
ON LEAVE. The majority of men owning motor cycles who are serving abroad know by now that petrol is obtainable for use whilst on leave by applying to the Controller, 19, Berkeley Street, W. A good tip is to apply in time, and call personally for the permit.

AN ORIGINAL GEAR BOX DESIGN.

Simplicity and the Four-speed Gear.

THE ingenious and compact four-speed gear designs illustrated on this page are the work of Mr. B. Malkin, 123, Lockend Road, Leith. Taking the sectional view at the bottom of this column, it will be seen that the chief merit of the design lies in the small number of pinions employed in obtaining the necessary ratios, thus cutting down cost of manufacture and tending in the direction of general simplicity.

The first design may be described as follows: The drive is transmitted to the mainshaft A through a clutch in the usual way. To this shaft the pinion B is fixed; similarly, the drive is conveyed from the gear box by the sprocket or belt pulley D, which is integral with the pinion E. The pinion F, lying midway between these two mainshaft pinions, is mounted on a splined or square sleeve running free on the mainshaft. On this sleeve are mounted the dog clutches L and M.



Sectional and elevation drawings of the gear control of four-speed gear box.

The pinions G, H, and K are free to rotate independently on the layshaft, but either or both G and K may be connected to H by the dog clutches O and P on respective sides of H.

The dog clutches L and P are operated together, so that either E may be connected to F or G to H, but not simultaneously. The same applies to the dog clutches O and M, which respectively can bring the pinions B, F, K, and H into communication.

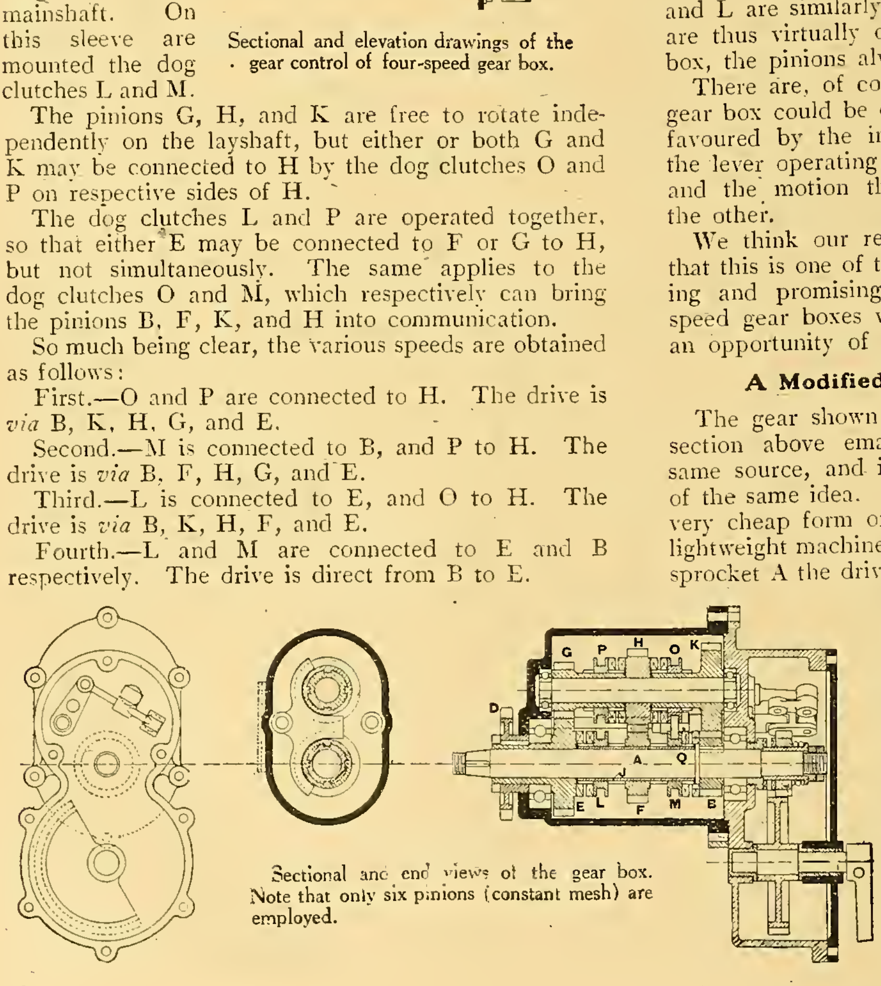
So much being clear, the various speeds are obtained as follows:

First.—O and P are connected to H. The drive is *via* B, K, H, G, and E.

Second.—M is connected to B, and P to H. The drive is *via* B, F, H, G, and E.

Third.—L is connected to E, and O to H. The drive is *via* B, K, H, F, and E.

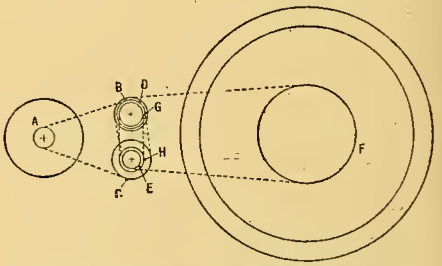
Fourth.—L and M are connected to E and B respectively. The drive is direct from B to E.



Sectional and end views of the gear box. Note that only six pinions (constant mesh) are employed.

Referring to the gear ratios obtainable, the invento assumes the following:

Number of teeth on pinion	G	14.
,, ,, ,, ,, ,,	E	28.
,, ,, ,, ,, ,,	H	21.
,, ,, ,, ,, ,,	F	21.
,, ,, ,, ,, ,,	B	18.
,, ,, ,, ,, ,,	K	24.



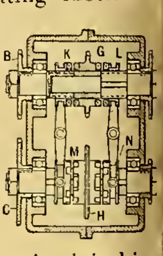
Showing one form of application for use on lightweights, three chains being employed in obtaining the four gears.

This will give proportions of 4½, 6, 9, and 12 to 1

The dog clutches O and M are operated by mean of the double fork Q, fixed to a sliding bar, while and L are similarly operated by another bar. Ther are thus virtually only two sliding parts in the gea box, the pinions always being in mesh.

There are, of course, numerous ways in which th gear box could be operated, but a car gate change favoured by the inventor, the oscillating motion the lever operating one sliding bar, and the motion through the gate the other.

We think our readers will agree that this is one of the most interesting and promising types of four-speed gear boxes we have yet had an opportunity of examining.



A chain-driver box embodying th same principles.

A Modified Design.

The gear shown in diagram and section above emanates from the same source, and is a modification of the same idea. In this the inventor is aiming at very cheap form of gear, intended for application lightweight machines and cycle cars. From the engir sprocket A the driving chain passes over the sprocke B and C mounted on the gear bo The rear chain passes from tl two sprockets B and E to tl sprocket F of the rear wheel. I side the gear box are the tw sprockets G and H, connected l chains of a suitable type (gea may be used in preference sprockets). The sprockets B, and D are free to rotate ind pendently, but G can be connect to either B or D—as already d scribed in the previous inventi —by means of dog clutches (K a L). Similarly, the sprockets

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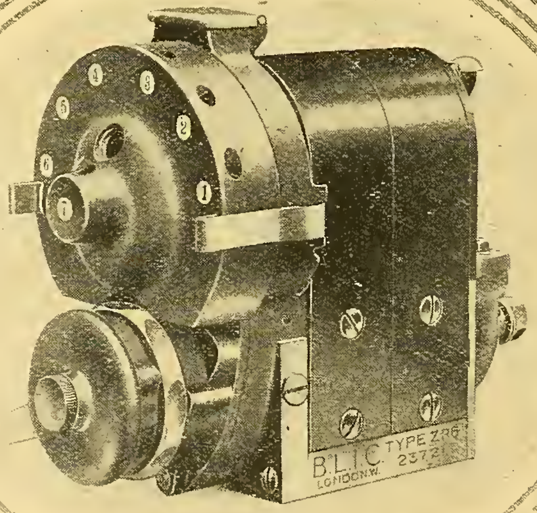


ı Original Gear Box Design.—

, and E can be brought into contact by the dog utches M and N. The four gears are obtained as ollow:

.) A, C, H, E, F. | (3.) A, C, H, G, D, F.
.) A, B, G, H, E, F. | (4.) A, B, G, D, F.

It will be seen that the first and fourth gears are irect drive, and the gear box contains only two rockets and four dog clutches. The direct drives can e obtained for second and third by a slight rearrangeent of the sprockets. The operation of the gears could be as shown, or, alternatively, by a system similar to that described in the first invention.

This latter gear box does not appeal to us as being so highly practical as the first, but the inventor considers that the difficulties it suggests are more conspicuous on paper than they would be in practice. It may be pointed out that in machinery of all varieties chains are arranged as shown in this idea, and that experience proves that, provided the chains are in proper alignment, they are seldom a cause of trouble.

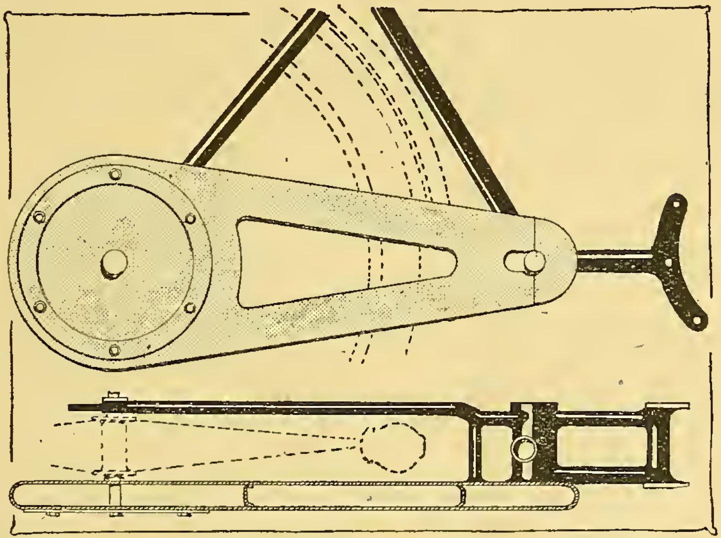
We certainly think that Mr. Malkin is to be complimented on these two interesting designs.

A Chain Case Integral with the Frame.

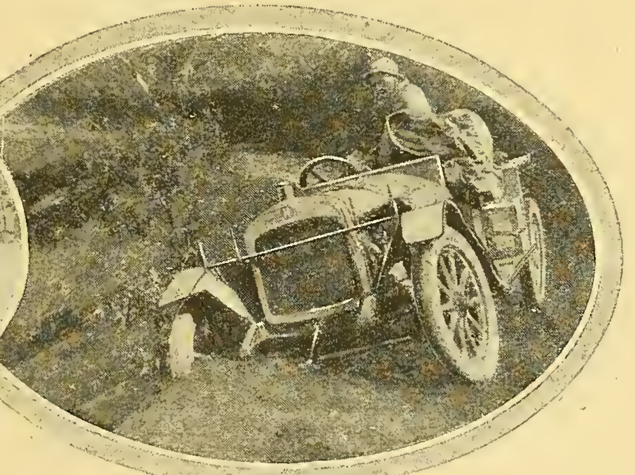
THE Limana, a rather revolutionary patented esign of chain proctor, can be built ito or built up with ie frame of cycles of ormal diamond type esign. Instead of eing an accessory, ie chain case beomes an integral and ssential part of the ame, taking the place f the chain stay tube n whichever side of ie machine the final rive is situated.

It consists of a ctilinear section ollow U tube bent ito an "oblongated" orseshoe or magnet iape, the open ends f which are covered ı by a detachable cap, semi-circular in shape, as ie designs make clear. When, too, the bend of the horseshoe is filled up and provided with an inspection cover and two side panels added it does not require much more to make a totally-enclosed oil bath and case for chain and sprockets.

This is briefly the idea as patented, and its adaptation to varying models is a matter for its builders. The drawings will be more enlightening than any amount of explanation, but it should be noted that the Limana confers extra rigidity to the frame where it most needs it, is noiseless, and an absolute protection to the transmission. It may also be used for the final drive of belts. Removal of the wheel is easy.



A unique design for a chain case. The idea, which is patented, was sent to us by C. S. Harvey, Como, Italy.

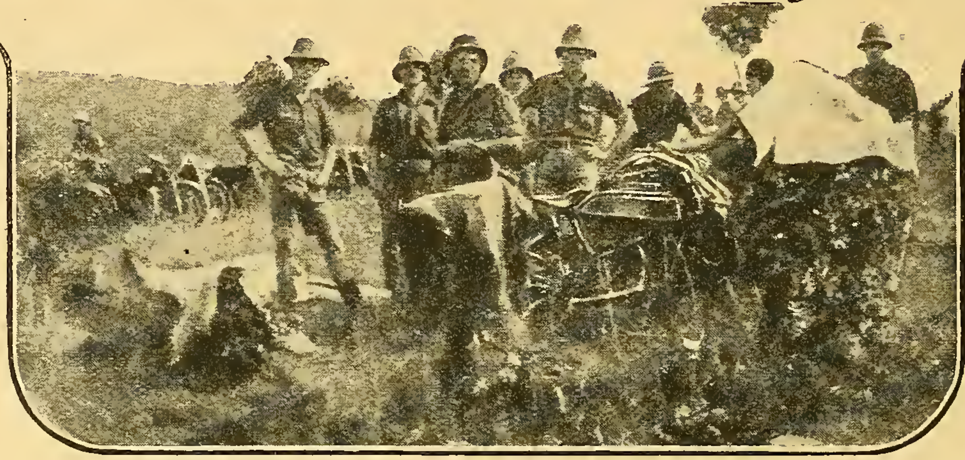


WITH THE BRITISH FORCES IN NYASALAND (See next page).

Treking along the road made by the engineers. Many miles of such roads were laid through dense bush country under bad climatic conditions.

A transport car that had a narrow shave on a hairpin bend; had it gone right over it would have rolled 1,000 feet down into the gulley below.

With the British Forces in Nyasaland.



A group of motor cyclists in the bush of Nyasaland. In the background may be seen a few of the machines, chiefly B.S.A.'s.

How a Small Body of the S.A. Motor Cyclist Corps bravely held back an Attack on the Lines of Communication.

THE following details of the campaign with the S.A.M.C.C. were sent to us by Lt. E. W. Mathieson (Nyasaland Field Forces), and convey a good idea of the difficulties motor cyclists had to encounter in the wild districts of East Africa:

"Not having seen anything recently about the S.A.M.C.C. in *The Motor Cycle*, I thought it was up to me to supply a few lines. [An article appeared recently illustrating the campaign in German East Africa.—Ed.]

"Very few people, especially Oversea folk, know that such a corps exists, and I have every reason to believe that we are the first of its kind ever put in the field.

"At the beginning of the campaign we numbered 300 strong, but in consequence of the privations and bad conditions endured we have dwindled down to forty—all that is left of the first 300. Of course, we have been receiving reinforcements all the time, but even now we are not up to half the original number.

"We have been over eighteen months in this country without any break at all. Originally we were with the Northern Forces and were in the big push, during which 75% of the corps were knocked out with sickness, etc.

Bluffing the Huns.

"In the rush on the Central Railway we were among the first to reach the goal. The problem was to join up with the Southern Force, and naturally we motor cyclists being so mobile were the first to shake hands with the other force, both they and our main body having worked from either side of East Africa.

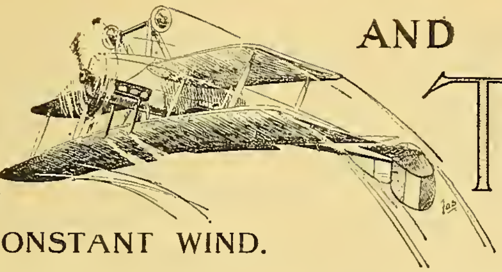
"It was here that our corps played a marvellous game of bluff. The Huns informed us that they were going to recapture the town. Motor cyclist patrols were buzzing in every direction, and the men were doing thirteen days on three days' rations. Fortunately a little food was to be obtained on the land. Whichever direction the Huns advanced they were met by cyclists; every path and track was utilised by us, and when they forced our people to retire here they next found that others were again on each flank behind them, and so after a few weeks they gave up the idea of recapturing the town. Prisoners that were taken afterwards showed a great interest in the corps, and informed us that they made our strength out to be 2,000. I suppose you will hardly credit it, but there were no more than 250 of us in the place. Owing to the corps being able to move so quickly, and consequently being here one day and there the next, they could not make out our strength at all.

Disappointment.

"We pushed on, and when the rainy season came we were so far forward that the Northern Force we were with left us behind and we were promptly taken over by the Southern Force. Soon after the Northern Forces went home on leave—what a disappointment it was to us, for had we not been so far forward we would have shared the same pleasure of a well deserved run home. It was with the Southern Force that the corps did another fine piece of work. The Huns were just about to cut our lines of communication when our General sent us forward to hold them back. Our numbers were exceedingly small, but we were quickly despatched, and forty of us held back over 500 until reinforcements came up and so saved the situation. Our casualties were heavy, but apparently our luck was in, and the way the General afterwards thanked the men made each one who took part in the scrap feel a hero on his own.

"We are still up here and would not be surprised to see the last of the campaign. Of course, all readers of the 'Blue 'Un' know that we are mounted on B.S.A. machines, and we cannot say enough for them; in fact, most of the men would be afraid to try any other make in this country."

FLYING FACTS AND THEORIES



THE INCONSTANT WIND.

By W. G. ASTON, A.M.I.A.E.

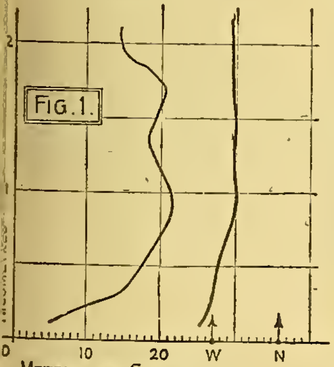
REVERTING once more to the question of turning "up" and "down" wind (after this article I am in hopes of getting clear away to another sject), there is one point that has not, singularly eugh, been brought up by any correspondents, but jtifies none the less a certain amount of consideratin, although its influence upon the "up" and ‘lown" question is comparatively slight.

The primary assumption which I made when going io the matter of relative motion was that the speed o the wind was constant. In actual practice this is srcely ever the case for more than a second or two tgether; indeed, its variations both in respect of sength and direction are proverbial. It may be not thout interest, therefore, to glance into the inditions which such wind changes promote. The amount o energy that is dissipated by gusts and other wind eects is perfectly amazing, and it is almost incredible tht it is all derived from comparatively small differences in local temperatures. If it could be eectively tapped the supply of power in, say, a cubic ile of air on an average day would be enormous, en disregarding the bodily motion of the volume as a whole, and only taking advantage of the small sts. Wind variations are of every conceivable kind, om the very big changes in speed to the very small anges in direction. For the moment, however, we ll neglect the gusts and consider only the larger ects.

Wind Charts.

Wind is a relative movement between the earth and s surrounding atmosphere, and as a consequence the nditions are exactly analogous to those of any other dy moving through a fluid. Where the fluid and e body meet friction takes place, the result being a ndency for the fluid to stick to the body, and in consequence to slow down. One would expect, therefore, s is the case, that near the ground the wind speed tends to be generally less than at a fair altitude, and also that, owing to differences in earth configuration, there is more likelihood of the direction being definite and steady high up than at ground level. Also at very high altitudes the wind will have a most decided tendency to be very constant indeed.

FIG. 1.



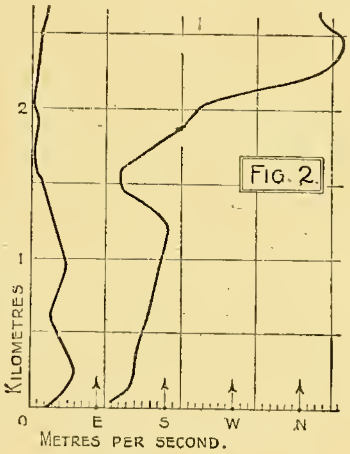
Wind of variable speed.

In figs. 1 and 2 are given actual wind charts, which show to what extent these variations occur. Fig. 1 is a striking, though not very unusual chart, whilst fig. 2 is more interesting, because it shows what *can* happen, even if a rare occurrence. The height in kilometres is shown on the vertical scale; on the horizontal scale are shown both wind speed in metres per second and compass bearings. In each chart the left-hand graph relates to speed and right-hand to direction. With regard to the latter, the point marked N (North) is zero, and each square represents 10° of inclination away from that point. Thus above 1,000 metres of altitude the wind charted in fig. 1 has a fairly constant direction pretty nearly west-north-west, but with a slight tendency to west, which becomes more marked as the altitude is increased.

This figure shows that the biggest speed differences are occurring near the ground; thus, in less than one kilometre of altitude, the difference is about seventeen metres per second; or, roughly, a wind of ten miles an hour at 300 feet becomes at 3,000 feet one of fifty miles an hour. Above this point, however, it tends to slow down again, but by no means steadily.

In fig. 2 the maximum speed differences are much smaller, and the greatest wind is at 600 feet, after which it gradually tails off to a very small figure. But look at the direction variation. Due east at ground level, the wind is nearly due south at a height of $1\frac{1}{4}$ kilometres. Then it goes east again, becoming due south at a little less than two kilometres. After that it goes first due west and then due north, with a final attempt to get west again. In short, inside 8,000 feet it completely boxes the compass!

FIG. 2.



Wind of varying direction.

Wind Gradients.

Now, supposing we take the conditions recorded in fig. 1 and imagine an aeroplane about to start a flight. Neglecting the actual difference in direction, we will say that the wind is steadily from north-west. If we fly north-west we shall as we climb be meeting a wind that continually gets stronger and stronger up to about 3,000 feet. The immediate effect of this will be that

Flying Facts and Theories.—

the aeroplane will climb more rapidly than it would do, *ceteris paribus*, in perfectly calm weather. As it engages each successive layer (as it were) of air, it will momentarily have an increased speed relatively to it. If its ordinary air speed is 100 m.p.h., it will keep this speed constant only so long as the wind itself is constant. If it suddenly strikes (by climbing) a layer of air travelling faster, its air speed will momentarily rise, say, to 101 m.p.h. If it stopped in this layer of wind the air speed would drop back, of course, to 100 m.p.h., but, if it continues to climb, the "wind gradient" goes on helping it by always trying to increase its air speed. This effect, of course, falls off immediately the maximum wind speed is passed. Thus, referring to fig. 1, the climb will be unduly fast up to .9 kilometre; from that point to 1.3 kilometre it will be unduly slow, since now the "wind gradient" is in the opposite direction and the speed is dropping instead of rising. From 1.3 kilometre to 1.7 kilometre the climb, however, will be again accelerated, and then, in turn, diminished up to two kilometres. This is, of course, always provided that the machine retains its N.W. direction. It will get the best climb possible by altering course in accordance with the wind gradient, *i.e.*, by flying N.W. up to .9 kilometre, S.W. from this point up to 1.3 kilometre, then N.W. again up to 1.7 kilometre, and finally S.W. up to two kilometres. If it reverses these tactics it will climb unduly slowly.

Starting from the Ground.

For this reason the climb performed by the same machine varies very much on different days, apart altogether from the help that may be gained from upcurrents. When watching an aeroplane, one always receives the impression that it climbs faster when flying "into" the wind, and this is actually the case when the wind gradient is favourable, as almost always obtains near the ground. If the wind gradient is unfavourable, however, it will climb more quickly by flying *with* the wind and not against it. If the wind were steady and the same speed all the way up the altitude scale, it would make no difference to the rate of climb of the aeroplane in whatever direction its pilot chose to fly, except for the fact that one gets off the ground with a shorter and slower run against the wind. With the wind the run is longer and faster, but, needless to say, lasts the same time.

Sudden Wind Changes.

It will at once be perceived that if the aeroplane gains an advantage from relative speed by climbing in accordance with the wind gradient, it can equally well lose to the same extent when it is descending. Referring to fig. 1 again, if the machine is gliding at its natural speed at .9 kilometre of altitude, and is travelling N.W., then it will find each successive layer of air travelling slower and slower. If it starts gliding at its very minimum speed, it is conceivable that the wind-gradient may cause it to stall, since on striking a lower layer of air the relative air speed may momentarily fall off.

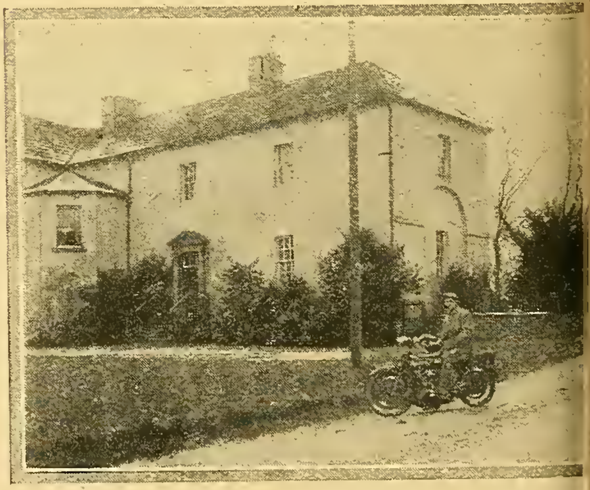
Now it is not only in gliding that an aeroplane loses height. As we have seen, an aeroplane can lose height on a turn, and thus the wind gradient may assist in the reduction of speed, and therefore in th tendency to stall. Imagine a range of mountains lik a wall 2,000 feet high, and a steady wind to be blowing across them. Whilst an aeroplane is 2,010 fee up it is flying relatively to this wind, but if it drops t 1,990 feet it immediately meets with entirely differen conditions. If the wind speed and the aeroplan speed are the same, then the drop of 20ft. (this is very imaginary case) may cause the entire loss of it original relative velocity, so that once below the leve of the top edge of the mountains it will have to do violent nose dive to regain its previous speed in th still air.

Losing Height on a Turn.

A similar state of affairs, though immensely modified, can occur when a machine loses height on turn, and especially near the ground, where, owing t the presence of shielding objects such as trees c houses, or to the configuration of the ground bein such as to promote the formation of surfaces of discontinuity (regions of "dead" air), the wind gradien is liable to be very severe as well as changeable. I is for this reason that any sort of turn near th ground is more or less dangerous, the worst of all bein that in which the speed of the aeroplane is but littl above its stalling speed. With a variable wind, therefore, turning "against" the wind is not necessaril the same as turning "with" the wind, but, as previously pointed out, if the wind is constant in spee and direction the two evolutions are identically th same.

The wind gradient refers only to wind spee But a similar consideration exists in regard to direction. Thus, if as a machine turns the wind als changes in horizontal direction, then the aeroplan may be momentarily either lifted or depressed. Th former will take place if, when the aeroplane is turning, the wind changes and meets it "nose on" o "ahead"; the latter if the wind changes and meets "astern."

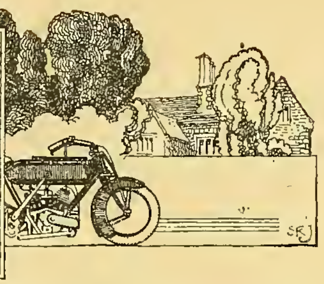
Further effects of gusts will be dealt with in th next article of this series.



The old inn and posting house at Greta Bridge, near Barnard Castle, where Dickens stayed whilst in the North of England. The "snug" used by him can still be pointed out in this interesting place.

MOTOR CYCLE DESIGN

AN ANTICIPATION OF FUTURE DEVELOPMENTS.



ON Tuesday, the 19th inst., Mr. A. G. Pendrell read a very interesting paper before the Coventry Branch of the Institution of Auto-obile Engineers on "Motor Cycles." In this paper Ir. Pendrell dealt very comprehensively with the lead-g features of motor cycle design in the past, and dicated certain lines along which developments might e most profitably directed for post-war enterprise.

The following remarks are entirely taken from his aper, and they are not necessarily to be regarded s expressions of our own opinion.

Design.

The motor car and the push cycle were at first used r pleasure: their practical everyday use came later, nd resulted in an expansion of their market; the same ay be expected to take place with the motor cycle, hich, on the outbreak of war, was just passing be-ond the pleasure stage.

The frame, as the most important part of the design, eeds the fullest attention. Frames at the present me are perhaps the most unsatisfactory and least eveloped part of the machine. Spring frames are s far off as ever, although the attention recently evoted to this subject bears every promise of pro-ucing good results. In such a detail as forks, cycle ractice has been followed far too closely—for in-tance, the practice of gripping the handle-bar stem y means of a slot in the steering stem is very crude, nd it is time a more substantial design was introduced.

As regards wheels, an easily detachable spindle, nabling the tube to be simply inserted with the wheel *n situ*, would be likely to give more satisfaction in ervice, especially on solo mounts, than would the niversal application of an interchangeable wheel, ith the consequent necessity of carrying a spare.

Although engines are continually receiving atten-ion, and alternative types are always being brought orward, the 3½ h.p. single-cylinder of about 560 .c. is undoubtedly the most popular, and is likely to emain so for some time, while such an innovation as he wide application of outside flywheels is not likely o materialise rapidly, if for no other reason than that y placing the flywheels in the crank case the energy hey store is kept closer to the bearings.

The slow running of most engines is bad, this being nainly due to faulty carburetter design, and makers ight advantageously take a few hints from American ractice, in which the maker of the machine also nakes the carburetter or has it made to his designs.

An Extraordinary Statement.

Perhaps the most extraordinary statement made in the paper was on the subject of magnetos. Mr. Pendrell suggested that after the war we should in all probability have to return to German magnetos. His argument was that, while British magnetos are excellent mechanically, they are not quite perfect as regards insulating compound used for the mouldings, and such foreign magnetos as are now available may at the best of times only be regarded as third-rate substitutes for the German article. Also, the English magneto manufacturer would find the question of output one needing his serious attention, as it would seem that the combined English output would scarcely supply Coventry alone. One English firm, recently receiving an order for 300 magnetos from a firm of motor cycle makers, had to order tools and sufficient material for their production!

There is little doubt that the introduction of the clutch and change-speed gear has led to a general reduction in the quality of engine tune. Engines could then be so much more easily started by means of pedals, consequently the clutch indirectly necessitated a variable-speed gear, which again made engine tune of less importance than it had been previously. As regards the type of gear box, the sliding pinion type is likely to give most satisfactory service in practice, and the constant mesh pinion type is always likely to remain a second in point of number. The gear box also may account for the increased noise of the present day motor cycles over those of a few years ago. Gear boxes make a noise, and the efficiency of the silencer has been deliberately reduced so as to drown the noise of the gear box!

Front brakes and mudguards are subjects now receiving some attention in the press, and there is no doubt that too much airing cannot be given them. Probably the fitting of good size leg-guards is the only possible solution of the mudguarding question.

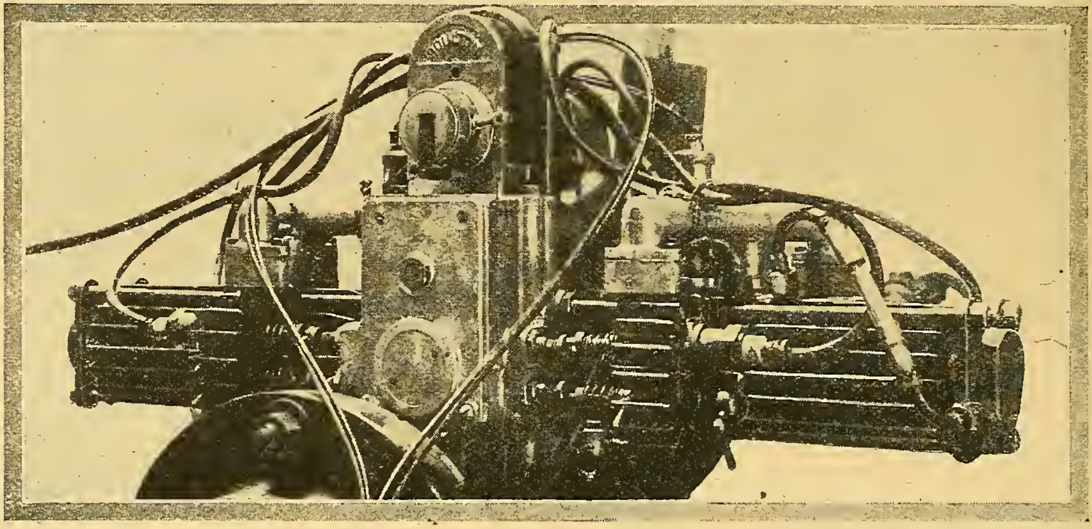
T.T. Suggestions.

The T.T. race is a matter that might profitably be considered, and is one that lays itself open for some improvements. For instance, instead of serving to lionise one machine and one rider, the winner, it would probably be of more real use to the trade were the machines finally placed in classes according to their speed, the machines in the various classes being arranged in alphabetical order. There would be a first class of 50 m.p.h. and over, second class of 45 to 50 m.p.h., and so on, the speeds given being the average speed for the whole course. The character of the race has been entirely altered from that originally intended, and a revision of this intention would be for the good of all concerned.

Everyone agrees that present day machines are far too heavy, but weight cutting must certainly not be done at the expense of strength, consequently the only alternative is the use of high-class materials and designs that allow of less material being used.

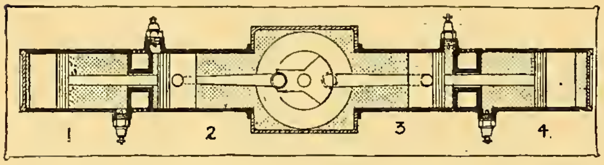
THE FROST TANDEM FOUR-CYLINDER.

A British Engine of Remarkable Design, constituting a Power Unit weighing 70 lb., and developing 23 h.p.



The clean line appearance, due to the employment of horizontal fins, is somewhat marred by the temporary fittings for test purposes. The overall length is not so considerable as might be supposed. The capacity of the engine is 790 c.c.

When speaking of four-cylinder motor cycle engines one's thoughts are apt to fly at once to the production of our American Ally as embodied in the Henderson and Pierce, or again to the Belgian F.N.; and good examples they are without a doubt. For some time there have been rumours that British manufacturers are experimenting with the four-cylinder, and we are now able to give details of one of these engines. This is to be known as the Frost, and it is now in an advanced experimental stage at the works of the Frost Patent Engine Syndicate, Ltd., Wolverhampton.



A diagram showing the action of the Frost engine. The firing spaces are indicated by the plug positions. A two-throw crank set at 180° is employed.

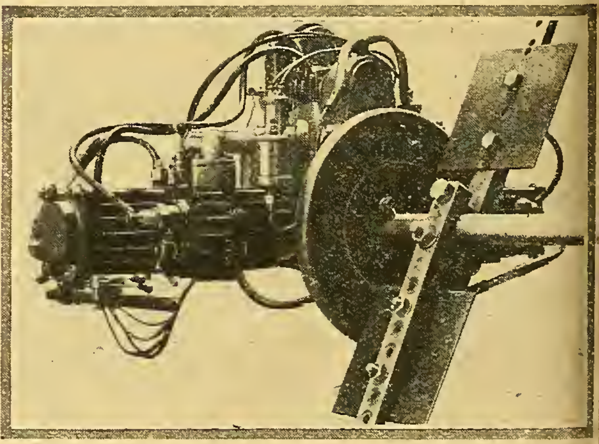
In appearance it may be easily mistaken for a flat twin, a little longer than usual, it is true, but it is in effect a horizontally opposed four-cylinder with two cylinders placed end to end on each side of the crank case.

Its action may be seen on referring to the diagram herewith. The pistons are connected in pairs by a rigid connecting rod sliding in a gland; on each side of this gland are the firing spaces or combustion "heads." The inner pistons only have gudgeon pins and connecting rods, and the crankshaft is of the usual two-throw type. With No. 1 cylinder in compression, No. 2 is at the end of its inlet stroke, about to compress; No. 3 is at the commencement of the exhaust stroke, and No. 4 is completing the exhaust stroke.

The valve pockets are placed alternately two on each side, and the valves are operated by simple cams, rockers and spur wheels driven from the shaft as in usual practice.

Lubrication and Cooling.

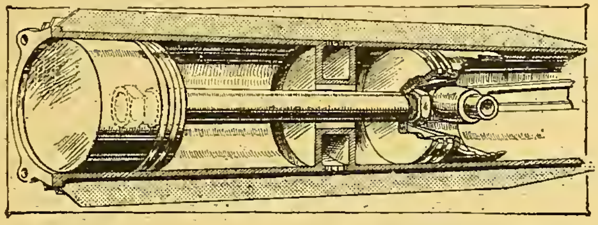
These are points which occur at once on considering any tandem type of engine, but here we have the two compression spaces separated by a hollow air-cooled gland lubricated by forced feed. There is also a novel form of internal cooling embodied



The Frost engine under test, a fan brake being employed to provide the load. The heavy outside flywheel should be noted.

The Frost Tandem Four-cylinder.—

throughout the engine. For the present we are not at liberty to say more than that it is simple, automatic, and very efficient; in fact, in the early experiments it was found to err on the cool side, and certain dimensions were varied to correct this unexpected fault. Tangible evidence of its very cool running was afforded when, after a five minutes' run at high speed, we were able to bear our hands firmly on the outer cylinder cover plates, and even around the firing spaces it was not unduly hot.



A sectional view of one pair of cylinders, showing the air-cooled gland between them.

Horse-power and Weight

Now as to power. The engine at present is on the test bench, and we were able to see it in action with a fan brake dynamometer. Each cylinder is 60 mm. bore × 70 mm. stroke (this capacity is slightly reduced by the central rigid connecting rod), the total capacity is 790 c.c. At 2,500 revolutions it developed about 14 h.p., and at 3,000 it had jumped to no less than 23 h.p. Some engine without a doubt! This without special tuning and under the handicap of faulty carburation, which was difficult to regulate with two separately-controlled Amac carburetters. Naturally, at such high speeds it showed a little vibration, but it was very slight.

Weight per horse-power is an important point, and as the total weight of the unit may be given as 70 to 80 lb., it works out at about 3½ lb. per h.p. at its best speed; this may be further improved as developments proceed, but it is light enough for motor cycle purposes as it is.

Other Questions.

Petrol and oil consumption is not yet ascertained, but it should compare favourably with other types of four-cylinder machines. The overall length may be a drawback for some purposes, but the frames of several models are being designed at between 60in. and 70in. wheelbase; it is also proposed to utilise it crosswise in the frame of a three-wheeler of the Morgan type. The cost of production is remarkably low, there being only a simple crankshaft, a small crank case, two connecting rods, and a minimum of machining in the cylinders and valve pockets.

For test purposes the current is supplied by a four-cylinder Boulton magneto—another interesting Wolverhampton product.

Certainly it is a remarkable engine, and one which promises great things in the future, but it is of such an unusual design that one hesitates to offer any criticism at present. Its behaviour on the road will give more definite information, and no doubt will expose some faults, but so original a designer should be capable of countering any reasonable defect, and we look forward to its progress with considerable confidence.

Motor Users, Producers, and Distributers.

The First Steps towards the Formation of the Motorists' United Council,

A MEETING of the United Council of Motor Users, Producers, and Distributers, in its provisional form, was held on Tuesday, February 12th, at the Carlton Hotel. The chair was occupied by Mr. E. Manville. The terms of reference of the Council had been defined at a previous meeting, substantially as follow:

(1.) To ascertain to what degree it is possible for motor users, producers, and distributers to arrive at complete or substantial agreement as regards laws and legislative measures advantageous or disadvantageous to the interests represented upon the Council.

(2.) To use the united influence of the interests represented upon the Council with a view to securing or checking legislation in accordance with the decisions reached under Clause 1.

(3.) In respect of legislation, kindred matters and technical questions in relation thereto, to use its influence to discourage any organisation from acting in a manner calculated to impede the policy, or to injure the interests of those concerned, and to encourage united action and mutual support.

Up to the present eleven recognised organisations have either elected representatives to serve on the Council, or have signified their desire to do so. It has been unanimously resolved that the Council should not allow lack of support from the Committee of any one organisation to delay the inauguration of an active programme.

It has been unanimously determined that the proportional voting power of the three groups of which the Council is formed shall be as follows: Users 24, producers 12, distributers 8.

Also, that the Council, as such, shall not take public action on any matter except as the result of a unanimous resolution.

The Council has taken powers to constitute committees to consider and report upon specific subjects.

A letter and questionnaire will be sent out at an early date with a view to ascertaining the opinions of members of both Houses of Parliament as regards a number of questions of policy which will come before the Council for consideration at an early date.

The officers of the Council will be elected at the next meeting, at which further steps will also be taken to determine the exact allocation of votes to the various bodies coming within the three main groups, the aggregate voting power of which has been already settled, as stated, so as to give the predominance to users of motor vehicles of all kinds.

Hon. sec. (*pro tem.*) Mr. Horace Wyatt, 39, St. James's Street, London, S.W.1.

CURRENT CHAT

Time to Light Lamps

Greenwich Time.

Feb. 21st	... ...	5.53 p.m.
„ 23rd	... ...	5.57 „
„ 25th	... ...	6.0 „
„ 27th	... ...	6.3 „

National War Funds.

The National Relief Fund (distributed £3,783,657)	£6,331,636	0	0
British Red Cross	9,097,823	0	0
Tobacco Fund	148,592	0	0

An 8,000 Feet Climb in Winter.

A rider of an Indian made a new winter record recently by climbing 8,000 feet up Mount Hood, Main, U.S.A.

Drivers Wanted.

Volunteer motor drivers who will undertake duty one night each week in the London district are wanted urgently. Apply, 225, Oxford Street, London, W.

Motorists' Associations.

Whether existing associations justify their existence or not may be open to discussion, and many people seem ready to argue that they do not. Whatever the ultimate result of this discussion may be, however, there seems little unwillingness to the formation of fresh bodies.

A Protection Association.

A letter appears in our Correspondence columns this week on a new association.

Harley-Davidsons for Meat Distribution.

Two Harley-Davidson sidecarrier outfits are being employed daily in connection with a meat distribution scheme in the Greenwich, Lewisham, and Lee district. Long, open boxes are used, designed to carry a whole side of sheep. The service is being run by contract by the local agent.

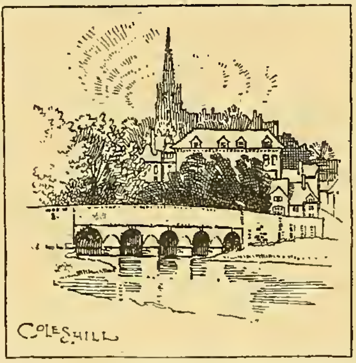
Holland's Supply of Motor Spirit.

We recently had a note to the effect that the fuel situation in Holland was even worse than that here. Holland, however, has partially overcome her difficulty by a recent arrangement with Austria-Hungary, by which she will receive a fair amount of fuel regularly. What Austria is to get in return is not made clear in the announcement of this arrangement.

Remarks on Clutches.

Any reader whose interest in the question of clutch design is of a more than purely popular nature will be well advised to read the article on this subject appearing in *The Automobile Engineer* for February.

As is always the case with articles in this paper, it is well written, and is by a man who has a complete grasp of his subject, both in practice and in theory. No motorist or motor cyclist is likely to read the article without adding very considerably to his knowledge on a subject that is now a matter for considerable attention on the part of designers and manufacturers.



A Novel Four-cylinder.

The new four-cylinder which we describe this week is named the Frost, but, despite the fact that its cooling properties are considerable, it is likely to prove anything but a "frost."

Another A.C.U. Victory.

An A.C.U. member was summoned at Weston-super-Mare recently for the illegal use of petrol. As the result of the defence conducted by the A.C.U. solicitor, the case was dismissed, and some twenty other summonses of a similar nature that were waiting to be heard were cancelled at the same time.

The A.S.E. and their Motor Cycles.

In some of the large munition works, we are informed that the members of the A.S.E. are still allowed to use their machines for travelling to and from their work. In other districts, however, many workers who had really good grounds for using their machines for this purpose have been heavily fined for travelling by motor cycle.

Special Features

AN ORIGINAL GEAR BOX.
A BRITISH TANDEM FOUR-CYLINDER.
LUBRICATION.

Petrol and Gas Licences.

Motor cyclists who consider they are entitled to a petrol or gas licence, and have been unsuccessful in obtaining one, should apply to the Secretary, Auto Cycle Union, 83, Pall Mall, S.W.1.

The Air Force Uniform.

Speculation has long been rife as to what the new Air Force uniform is to be. We hear now that the uniform is khaki after all, very much like the ordinary Service tunic. Rank badges are after Naval style—rings round the cuffs. Blue is to be adopted, so rumour says, *after* the war.

Price of Paraffins Controlled.

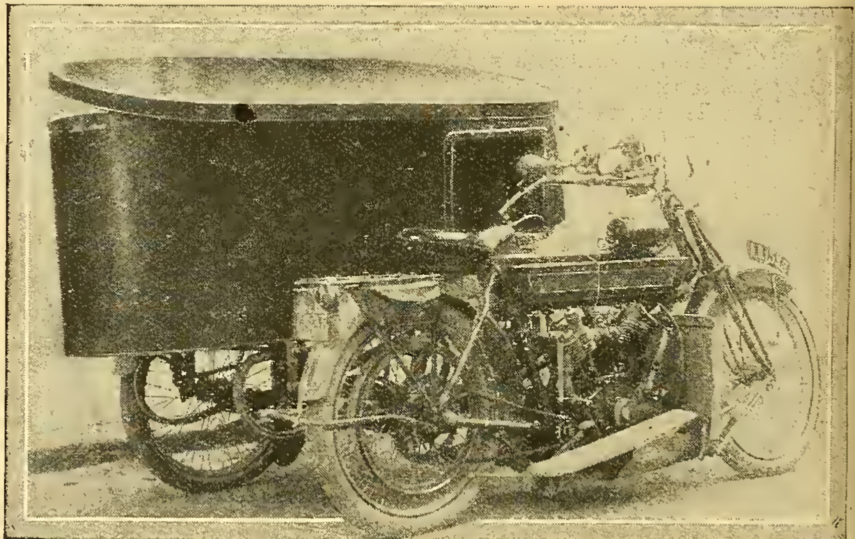
By a recent Order the price of paraffin to the consumer is to be not more than 5d. per gallon more than that charged to the retailer. In the case of lamp oil the amount is limited to 4d. In both cases the profit made by the retailer must not exceed 15% of the wholesale price.

Use of Gas.

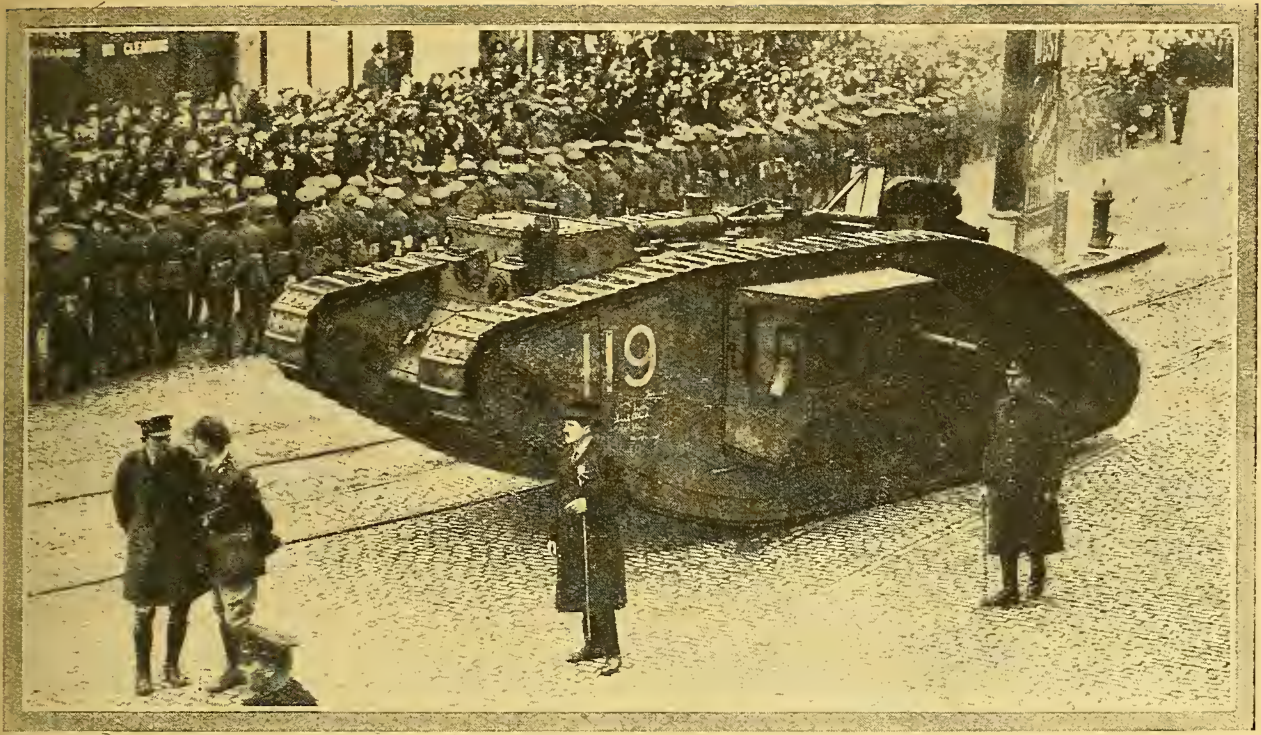
Only 4% of deliveries of gas bags to date have been to private motorists, and 4,500 commercial vehicles have been already equipped for gas, the result being a saving in petrol consumption of approximately 3,000,000 gallons annually.

Extensions.

Orders for equipment for some 2,500 more vehicles are already in hand.



An Enfield sidecarrier used by a baker for delivery of bread. Mr. H. Walmsley, Camborne, says the outfit has been in use every business day for three years. A feature is the commodious flour bin which replaces the ordinary sidecar body.



THE TANK BANK.

The travelling "War Bond" Tank which made its appearance in Coventry last week. Externally the Tanks are familiar to most people, although they still create great interest in the towns they visit.

Cycle and Motor Trades Benevolent Fund.

This is going strong.

The Last Meeting.

At the last meeting, held on January 31st, applications for election were received from 44 members and 196 subscribers.

And the Next.

This will be held on February 28th, at 4 p.m., at 154, Clerkenwell Road, and everything points to a further report of continuous growth being available.

The New President.

The new president of the council is Sir Charles Wakefield, who expressed his pleasure at the evidence of the good work performed by the Fund.

The Motor Cycle Police.

The police in Portland, Oregon, U.S.A., are using motor cycles, and the policemen motor cyclists have a pretty severe course of training to go through in the course of their careers. A correspondent who was present at one of these examinations reports that they had to take part in a slow race, a speed test, and a starting competition, in which they had to stand by their machines and see who could the most quickly get off the mark. Starting the engine first and getting under way by means of the clutch was not allowed. This was followed by a "trouble" test, in which each man had to locate the source of trouble in a machine which had been put out of order and then get it into working condition again. In addition to the actual riding and mechanical test, examination papers had to be passed. The competitor gaining the highest marks is appointed sergeant of the motor cycle police squad. There are eighteen machines in all doing police work in this city—twelve Harley-Davidsons, five Indians, and one Henderson.

Almost American!

A man recently brought up before the Stratford magistrates was alleged to have no fewer than ten stolen motor cycles in his possession, as well as many accessories. He was an engineer, aged 30.

That Inland Revenue Licence.

We are continually receiving from our readers queries in respect to the Inland Revenue licence, and asking if the querist is liable for its payment. The only circumstances under which exemption from the payment of this tax may be claimed with any chance of success is when the machine is constructed and used solely for the conveyance of goods, *i.e.*, when the motor cycle has a sidecarrier permanently attached.

The Type of Sidecar Body.

The sidecar body must be of the real sidecarrier type, and a touring body used for the carriage of goods does *not* come under this exemption.

Occasional Carriage of Passengers.

We are also frequently asked, "May I use my machine to carry a mechanic to help me in a job? My machine is fitted with a sidecarrier constructed for the conveyance of goods, and I use it chiefly for the carriage of tools. In the event of my needing help on a particular job, may I take a helper in the sidecar?" This is purely a matter for answer by the local authorities. If they are reasonable, nothing will be said; if they are normal, the result will be prosecution and conviction.

Petrol and the Tax.

It should also be remembered that if you have to pay the tax you immediately surrender the right to use free-of-duty petrol, and if you have already obtained a free-of-duty licence when you were fined for taking a passenger in your sidecar you will almost certainly be required to refund the full amount of the petrol tax that you have been excused from paying.

Some Advice.

Consequently, think twice before giving anyone a lift in your sidecarrier.

Queries on Postcards.

We do not make a practice of answering queries sent to us on postcards. Needless to say, our rule *re* the inclusion of the stamped and addressed envelope is broken by these queries, and, moreover, we hardly feel flattered at receiving a mere postcard asking for information that may require some hours' search before it is available.

Some Case!

A motor cyclist was recently dragged up in court to answer no fewer than six charges at once: (1.) Using petrol illegally. (2.) Driving without a proper silencer. (3.) Driving without a licence. (4.) Driving an unregistered motor cycle. (5.) Fraudulently using an index mark. (6.) Allowing the numbers to be obscured.

The defendant was, however, a member of the A.C.U., and was defended by that body, with the result that the whole case was dismissed on payment of the costs.

MILITARY NOTES.

A D.C.M., an Old "Contemptible," and Some Optimists.

D.C.M. FOR A FORMER MEMBER OF THE M.M.G.S.

WE are glad to learn that Sgt. Alfred Black has been awarded the D.C.M. for gallantry in the field. He enlisted through *The Motor Cycle* in the M.M.G.S., and after doing good work with the motor machine guns, and seeing no hope of going to the Front as soon as he wanted to, he transferred to the L.A.M.B. He was sent Overseas to Mesopotamia, where he has been since a year last October.

Sgt. Alfred Black, D.C.M., formerly with the M.M.G.S., now attached to the L.A.M.B. This snapshot was taken in Mesopotamia.

* * *

AN OLD "CONTEMPTIBLE."

TRAVELLING from London to Coventry recently we noticed a young officer wearing the Mons bar. A second glance revealed the fact that the soldier was Roy Lovegrove, well-known prior to the war as an expert Scott rider. Lovegrove went out as a motor cyclist with the first B.E. Force, and, seeming to possess a charmed life, is one of the few original despatch riders still serving. He is now a captain in the A.S.C., M.T.

* * *

WELL-KNOWN MOTOR CYCLISTS IN FRANCE.

WE recently had a brief but interesting letter from Sgt.-Maj. Sidney George, but he unfortunately does not send us his address. He writes from France, and says that he had recently the good fortune to run across Cpls. "Bizzy" and Harry Bashall. Both he and the Bashalls are fit, and all three hope to have a good time together when the war is over. Harry Bashall is driving a "high-speed L.G.O.," while "Bizzy" is running about on a Clyno sidecar combination. Sidney George is in charge of a motor cycle repair shop.

"CUSHY" JOBS AGAIN.

"TANK Driver," replying on the ever green topic "Danger in the A.S.C., M.T.," says:

"As a Tank driver who went through the whole of the third Ypres and Cambrai battles, I would inform Cpl. Richardson, who wrote in January 31st issue, that no M.T. man drove a Tank in those actions, and that if an M.T. man even entered a Tank at all he did so against all orders, and would probably have been detained by the crew, which consists *entirely* of Tank Corps men.

"I may add that I have never seen an M.T. man in any other capacity in a place that our fighting troops would not call 'cushy.'"

* * *

TWO WELL-KNOWN PRE-WAR RIDERS.

WE have received a letter from C. Pearson, who, before the war, was a rider of Douglas and Williamson motor cycles in numerous competitions, and was employed at Messrs. Douglas Brothers' London depôt. He is at present in the R.N.A.S. and engaged in overhauling and tuning aero engines.

He writes: "You may guess I still take an interest in motor cycle matters, and look forward to some big developments in the trade in the near future. I am writing to inform you of the sad news just to hand of Mr. Victor Garland's death. No doubt most of your readers remember him as a very keen motorist, who took part in the early competitions on Chater-Lea motor cycles and sidecar, and also on an 8 h.p. Williamsom sidecar combination. Garland had been serving the country for some time in the motor boat reserve, doing patrol work. I understand he was taken ill and passed away in Edinburgh Hospital on November 24th last. I feel confident that all his past friends will join me in expressing deep sympathy with his relatives through the medium of your valuable paper."

* * *

GALLANT ENGLISHMEN WITH THE FRENCH RED CROSS.

THE British Committee of the French Red Cross have just heard of the further award of decorations on a number of their volunteer motor ambulance drivers serving in one of their convoys in the vicinity of Verdun.

The names of the drivers so honoured are Mr. A. A. Hannay and the Hon. C. Hill-Trevor, Croix de Guerre with silver star; Messrs. J. Bower, W. D. Linsell, and E. Hartley Hacking, Croix de Guerre with bronze star.

* * *

MEDICINE FOR CROAKERS.

SGT. A. CONNELL sends us a brief letter and a photograph of a group of D.R.'s, which, it will be admitted, does one good to behold, for cheerfulness and optimism seem so very evident. He says:

"I am sending a photograph of the Guards' D.R.'s, most of whom have been in fighting up and down the Western Front since Loos, and are proud to have been chosen for this Division. Heartiest wishes to your excellent paper, which is eagerly looked for every week."

A group of the "Guards" D.R.'s, most of whom have been in the fighting up and down the Western Front since Loos. Reading from left to right—Back row (standing): Cpls. Abrahams, Gunn, Nesbitt, Broughton, Callaway, Davis, Reeve, and Ellis. Front row: Cpls. Gyles (on machine), Drew, Gyles (Art.), Cleland, Dudley (on machine), and Sgt. Connell.

LETTERS to the EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

PATTERN FOR PISTON.

Sir,—Being somewhat interested in the art of pattern making, and particularly in the article on the above subject in the issue of January 31st from the pen of "H.H.," may we be permitted to ask your correspondent to explain how the pattern he describes is to be moulded?

Sheerness. WOOD BUTCHERS.

A GOOD EXAMPLE.

Sir,—I thought perhaps that you would like to know that an old reader has responded to your appeal *re* "Join up now."

I feel sure that many motor cyclists after reading the appeal will become members of the A.C.U., as no doubt this is the first time the benefits have been so clearly explained.

HERBERT MORGAN.

ACETYLENE IN DIESEL ENGINES.

Sir,—I have a suggestion to put before you and the readers of *The Motor Cycle*. There have been many suggestions for the use of acetylene in internal combustion engines, but I think that it might be specially adapted for use in the Diesel engine. It seems to me that it would be impossible for a backfire to occur. Of course, as far as my limited knowledge extends, there are no makes of motor cycles or cars on the market which are equipped with Diesel engines, but I quote the old words, "Necessity is the mother of invention," which perhaps means that they may become universal some day. ERIC WADE.

FLYING IN A CURVED PATH.

Sir,—I wish you would grant me the opportunity to point out that your correspondent "Dyne" has inadvertently taken a rather unfair advantage of me, for, as you will no doubt be aware, the letter "Dyne" criticises was posted only four days after "Dyne's" first letter appeared in print. In reply to the assertion that there is one body, *i.e.*, the earth, travelling in a curved path under the impulse of *one* force, I must beg leave to differ; as a matter of fact, this statement controverts many accepted facts of astronomical science.

At the risk of appearing didactic, I should like to point out that there are many hundreds of forces acting on the earth, the most important being (1) the earth's own velocity and (2) the action of the sun, without mentioning such trivialities as the influence of the earth's satellite and the rest of the solar system. Moreover, the assertion that the earth is "still lapping round its curved path with undiminished vigour" is quite unfounded, and is considered by eminent authorities still *sub judice*.

I notice with regret that "Dyne" still adheres to a very loose and easily misconstrued construction of the King's English, but, apart from this, I am content, with "Dyne," to abide by Mr. Aston's solicited "convincing and entertaining" explanation. G.E.H.

Leeds.

Sir,—Under the above title, I have seen several letters lately in *The Motor Cycle*. Some of them reveal a lamentable lack of knowledge of the elementary principles of dynamics.

The definition of a force is "That which changes, or tends to change, the state of rest, or *uniform motion of a body*."

Newton's second law of motion also tells us that force = mass × acceleration.

The cases of the earth's motion round the sun and of a shell travelling in a non-resisting medium are therefore instances of bodies describing curved paths under the influence of a single attractive force. Their initial velocities, as Mr. Ellison says, would carry them on to infinity, if there were no force to change their paths. But a velocity is not a force. The force which caused the velocity has now ceased to act.

The only force acting on a shell in a non-resisting medium is the earth's attraction. This force generates an acceleration vertically downwards, and so an ever increasing velocity in the same direction. The shell has at any moment two velocities, one in the direction of projection and the other vertically downwards. The resultant of those is the path described by the shell.

Mr. Walmsley says, in his letter in your issue of January 10th, "For a given mass and accelerating force, acceleration is proportional to time." He is contradicting himself, for if the force and mass are given then by Newton's second law the acceleration can be determined, and, of course, has a constant value. It cannot, then, be proportional to a variable. What he perhaps means is "For a given mass and a given force the velocity is proportional to the time."

D. A. FAIRWEATHER.

BRITISH MAGNETOS

Sir,—Some time ago I was journeying from Southsea to Birmingham on my 2½ h.p. New Imperial-Jap, and up to then had had no trouble whatever with the machine, and I have covered over 10,000 miles, but when nearing Oxford I experienced misfiring, which I eventually traced to the magneto, and found the gap had by some means almost closed, and, having no magneto spanner with me, I took the very risky course of bending the rocker arm with pliers until I got sufficient gap, and by this means was able to complete my journey. On arrival in Birmingham, I took the machine to the makers of the magneto, namely, the E.I.C., Sampson Road, and asked them to look at the magneto for me and also put it in order. They overhauled it for me, altering it from anti-clockwise to clockwise, put an entirely new contact breaker complete with plated cover and cap, and when I asked for my bill I was astonished to find that there was nothing to pay. Just before the war, I had occasion to return a Bosch magneto to the Bosch people for overhaul. They did exactly the same work, the only difference being that I received a bill for £1 19s. 6d. Comment is needless. Of course, the usual disclaimer. C. E. HENLEY.

THE IDEAL SOLO MOUNT.

Sir,—In reply to "Cadet's" letter in your issue of the 25th ult., I agree with him, as far as the petrol consumption and tyre wear goes, that the lightweight beats the 3½ h.p. single. I have a 3½ h.p. Rover, clutch model, which, I think, cannot be rivalled for speed, power, and hill-climbing. I prefer a 3½ h.p. single to a lightweight for the following reasons: (1.) The heavier machine will hold the road better, and so reduce road vibration. (2.) You can attach a light sidecar without straining the engine. (3.) Greater speed. I can do 55-58 m.p.h.; with a little tuning, 63 m.p.h. can be attained.

I can get 80 m.p.g. on my Rover, and admit the lightweight beats me here. But I think this is counteracted by the above points, as I would rather have greater petrol consumption and less road vibration than *vice versa*. Before owning the Rover I had a 2½ h.p. two-stroke, and also a 3½ h.p. Triumph, so I can claim to have had some experience with a lightweight. The Rover has satisfied me in every way, and, although only a single-speed, it has climbed every hill I have yet met. BIG SINGLE.

Dartmouth.

SPRING FORKS.

Sir,—A few months ago you published a photograph and a description of a Triumph which had been transmogrified by its owner.

He substituted Rudge spring forks for the shock absorber of the Triumph, but ultimately, I believe, reverted to the standard Triumph forks. Why?

Having owned both makes of these machines, I should be much interested to hear why the excellent Rudge fork did not succeed, apparently, on the Triumph. Will the owner enlighten us?

ALLON.

GOODS MADE IN GERMANY!

Sir,—The whole question seems to me to depend on our winning the war.

If there is any patched-up peace the Hun will never get one farthing of my money to encourage him to further aggression; but, on the other hand, if he is thoroughly beaten, I think I have enough knowledge of his character, obtained by residence in his country, to feel that he will, with a little more humility and commonsense, direct his culture into less militaristic channels, and so make reconciliation more possible.

I trust that the "strong" gentleman, who is going to "discuss (!) the matter" with the "little" one in the presence of his armed friend, will not send me his address for saying this. I am a man of peace, at least, whenever possible, but meanwhile let us get on with the war.

W. G. ROBERTS.

Sir,—May I crave a little space in your excellent journal for a few remarks concerning "Goods Made in Germany?" After reading at some length the views of two different schools of thought, I have come to the conclusion that it is a matter entirely for one's own personal opinion and point of view—a matter better to be decided individually rather than collectively. To me it seems both needless and futile for the two rival camps to try and thrust their opinions down one another's throats. Liberty of thought in this country entitles each side to its own views. Unfortunately, the correspondence has not unfrequently degenerated into mere personal and mean insinuation—a thing very much to be regretted. The present-day paper shortage might very well be extended to letters, of that character!

But my object in writing to you, sir, is to suggest that, as the two sides have had a fair and proper hearing, you should now declare the correspondence closed, as no useful purpose is served by allowing the columns of a sporting paper to become an orgy of political controversy.

Personally, my next mount will be a Britisher with British fittings, for the simple reason of its being far superior to any other.

E. KEITT.

Sir,—May I say that my friends and myself are fully in agreement with your anti-German trade notice, and we shall continue to purchase the journal, even though the price be raised to 6d.

R. A. V. WILKINSON.

Sir,—It is quite apparent that Messrs. Ives and "R.O.W." are men possessing queer notions of decorum and propriety.

Apart altogether from the fact that the proprietors of *The Motor Cycle* may entertain well defined conceptions of their own, it is rather interesting to examine the logic paraded by Ives and "R.O.W." for consistency and evidences of mental calibre.

Can those celebrities conscientiously assert that the mere fact of your "leanings" on the aspect of Germany's clandestine and inhuman method of conducting war outweigh the purport and utility of your intrinsically valued paper?

It is amusing, and yet painful, to note the fact that those men adopt the exact means of pressure to enforce their case as do the proprietors of the "Blue 'Un," viz., by boycotting the paper, or, more certainly, by refusing to support it. I mean the same means are being used to attain given ends.

That the proprietors are not moral cowards is evident from the fact that letters "for" and "against" have been duly published.

I have a strong feeling that Ives and "R.O.W." have a sneaking regard for your fine paper, and "behind the door" will search its columns, more especially for help.

In the business world one learns to make debit and credit columns, thereby following attenuated results. In following this practice I shall only discard your paper when it ceases to be a font of pleasure and information. And may the "ethereal blue" prevent the possibility of religious or political bigotry entering within its domains.

To discard a man because of an expression of his, irrespective of the sum total of his other good qualities, is to stoop to low-mindedness and crass bigotry.

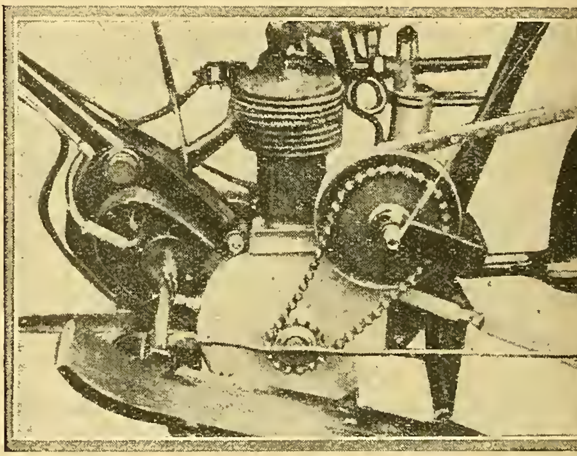
Of the war I have my thoughts and findings. I shall carefully nurture and pursue their sequences unobtrusively. But, in conclusion, may I suggest that my two *confrères* (motor cyclists) proceed to the bath of enlightenment and reform and there wash themselves. The operation will be healthful, and will refit them, with a needful spirit of tolerance, rectitude, and wisdom for re-entrance to the numbers of your valued readers.

D. SHARP.

HOW MANY GEARS?

Sir,—I have followed "Ixion's" writings for a considerable time, and have derived much pleasure and education from them. At the present time I notice he is referring to speed gears.

My opinion, after having used motor cycles, combinations, and motor cars from the earliest types, is that the multiple gear is the gear. It enables one to maintain a more constant engine speed, and does away with the unreasonable engine racing that is often so much indulged in to maintain a reasonable average in m.p.h. This in itself must relieve the engine of much undue wear.



Armstrong hub fitted as a countershaft gear.

Personally, I used to ride a machine fitted with a hub gear in the countershaft. This, I find, is very silent; it is very simple to change gears, and is approximately twice as strong as if fitted in the rear wheel. There is also another feature. Revolving as it does, it acts as an extra flywheel effect, which cannot in any way be otherwise than beneficial.

Enclosed you will find a photograph of a motor cycle to which I fitted one of the very earliest Armstrong cycle gears. It was a very strong model, much better than the later ones. An ordinary free-wheel was fitted on the outside, so that the internals were positive gears. This was fitted on the motor as shown with a chain wheel in place of the free-wheel; two flanges screwed to one spoke ring to form a belt pulley, making a neat three-speed gear. The control was on the top tube, as shown, and the wire conveyed *viâ* the saddle to the gear. It was an excellent addition to the machine, and contributed much to the pleasure of riding. This was in 1913. The machine I disposed of, and I have no idea where it is now.

At the present time my machine is the Syke cycle car, illustrated in *The Motor Cycle* some little while ago. This machine has a T.T. hub gear fitted in a countershaft position, and I must say that the gear gives excellent results. The top gear is approximately $4\frac{7}{8}$ to 1, yet the climbing properties of the machine are remarkable, with a load of two adults and one child.

I am now looking forward to the time when motoring will be permitted, so that I can give some proof of what the car will do. Of course, we must bear in mind the engine capacity is only 614 c.c., yet the machine has gone over Dunmail Raise with two adults and child and luggage, and climbed within a few yards of the top of Kirkstone Pass with the same load.

All being well, on the return of peace I intend to produce these machines, either twins, 5-6 h.p. and 8 h.p., or maybe a four-cylinder air-cooled model—all models to be similar in the chassis construction, only varying in the width of body for single or two-seaters.

JOHN W. TAYLOR.

THE MOTORISTS' PROTECTION ASSOCIATION.

Sir,—I shall be obliged if you can find space in your next issue to clear up the following. Numerous enquiries have reached me from motor cyclists all over the country as to whether they are eligible as members.

This is so. The association is "*out*" to protect their interests equally with those of all private car users on the lines already indicated. I have registered some thirty odd motor cyclists and shall be glad to hear from others as soon as possible. Just on 400 of the 500 members required as a minimum, before the first meeting can be called in London, have now registered their names (this since January 12th); when the number is reached all details will be discussed, and subscription fixed, etc. The latter, I hope, will be merely a nominal one, not exceeding £1 1s., as the association is "*out*" for *business*—not *social functions* and *wayside salutes*.

H. E. SAUNDERSON, Hon. Sec.
"Sussex House," 42, Howard Road, S. Norwood, S.E.25.

A SPORTING CHALLENGE.

Sir,—I am very pleased to see that my challenge to ride my K model Harley against any s.v. 85 × 85½ J.A.P. has been accepted by "A.C.," Cardiff.

With reference to conditions, I am willing to ride solo or sidecar on Brooklands any distance up to 500 miles, weights of both machines to be the same, and all other conditions equal. As I am at present in France, I am afraid it will be impossible to meet "A.C." until after peace is declared. If you will bring this match forward I am sure both "A.C." and I will be greatly obliged.

I shall be glad to consider any suggestions "A.C." may offer to make the match more sporting.

May I suggest to "Triumph" to try something more accurate than even the good speedometer he mentions, when I am sure the speeds claimed will be very different?

I might mention that the hill referred to by Lt. Addenbrooke in your issue of January 24th has been climbed this year by a Ford box car with three up on top.

B.E.F. S. A. MARKS.

ROTARY AND RADIAL ENGINES.

Sir,—I read with interest the article on "Rotary and Radial Engines" in *The Motor Cycle* of February 7th. I admit that the rotary and radial engines have made enormous advances during the last few years, but I think it will be some time before they become satisfactory when fitted to motor cycles. My reasons for this opinion are:

(1.) Even if the engine were successfully fitted in a frame or rear wheel these types require very much more attention than the reliable engines we are used to at present.

(2.) High petrol and oil consumption. In an aeroplane engine about nine to ten gallons of petrol and six to eight pints of oil are consumed in an hour. In the smaller model fitted to a motor cycle this would be greatly reduced, but even then it would be much more than the consumption of a single or twin of the same horse-power.

(3.) The oil-slinging capacity of the rotary type. The public are clamouring for clean machines, *e.g.*, good mudguarding, etc., and an oily machine would not be very popular unless enclosed. In the summer, when riding in dusty districts, it would be an awful job to clean off the congealed dust and oil at the end of a long ride unless the engine was totally enclosed, when it would seize for want of a cooling head wind.

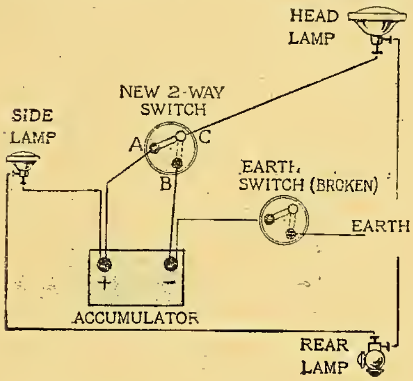
(4.) With the rotary type the engine would certainly have to have some efficient form of shield, because if a piece of the rider's clothing, or any part of him, should touch the engine there would be a nasty accident. If, to get over this, the engine were placed in the back wheel, it would have to be placed on a sort of belt rim to enable a hub gear and clutch to be used, and this would make the wheel lopsided, as well as increasing the tyre wear.

I do not want to give the impression that I think radial or rotary engines will never become popular when fitted to motor cycles, but I think they will have to be greatly improved.

CADET.
Dartmouth.

WIRING AN ACCUMULATOR SET.

Sir,—I am taking the liberty to write to you on the subject of "Chinook's" lighting problem, propounded in *The Motor Cycle* for December 27th. I am sure you will pardon the liberty and the lateness of so doing, but our mails take some time to filter through. I have read the replies in the next issue, and none of them seem to answer "Chinook's" question—*e.g.*, "but I am still hankering after a system whereby, by the addition of another switch and a yard or so of wire, all three lamps can be thrown into series." This can be done by the addition of one two-way switch and a very little wire. The enclosed sketch, I think, reduces alterations to a minimum, which, of course, is what is required.



With the two-way switch making contacts A and C, when the earth switch is made: Head lamp, full brilliancy; side and tail lamps, half brilliancy; break earth switch, no lights. With two-way switch making contacts C and B: Earth switch broken, all three lamps in series; earth switch made, side and tail lights only.

LIEUTENANT, R.N.

FLYING FACTS AND THEORIES.

Sir,—I much appreciated Mr. Aston's reply to myself and "O.J.F.S." on the subject of the "feel" of the machine in your issue of February 7th. I feel, however, that I must venture to differ from him in one respect. He says that I did not describe the "feel" of the machine, but rather that of the pilot. I contend that, except in the case of a "stall," during which the controls go limp, the feel of the pilot *is* the feel of the machine. Take an instance which appeared in my last letter—that of an inward side-slip. This is not necessarily brought about by a "stall," but rather by overbanking. The centrifugal force, as set up by the effect of the rudder, is not sufficient to keep the aeroplane from slipping. There are two ways of finding out what is happening: first, by looking at the "bubble" or spirit level—in my opinion a most unreliable and unnecessary gadget; secondly (which goes to prove my contention), by the sensations experienced by the pilot. The feel of the controls will not tell the pilot that he is side-slipping. There is no outward sign on the part of the aeroplane. No, the pilot, by reason of the draught of air on the side of his face and the "tube lift" feeling, knows that he is slipping, and corrects his error accordingly. I am convinced that the expressions "feel of the machine" and "feel of the pilot" mean one and the same thing.

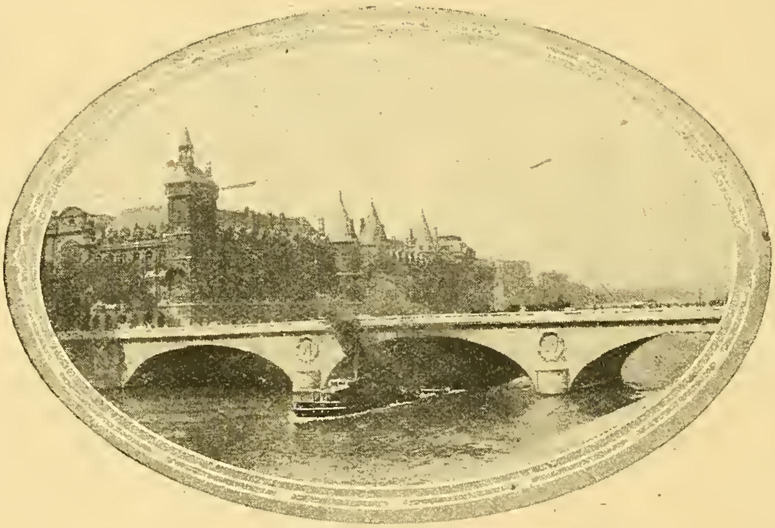
With regard to his problem which appears at the latter end of the article: in my opinion, I should say that the machine which descends in a plain nose-dive would certainly reach the ground before the one which "spun" down. I give a very old geometrical proof in support of this answer: that of "the shortest distance between two points is a straight line." The nose-diving machine carries out this formula. On the other hand, a spinning nose-dive is nothing more than a very exaggerated spiral, and, as such, covers a greater distance in the fall than a nose-dive. I do not know, and shall be interested to hear from Mr. Aston's solution of the problem, whether the spinning motion of the second aeroplane imparts to it an extra momentum which enables it to equal the speed of the first, but, judging from the fact that I have watched a machine performing both these "stunts" before venturing an opinion, I should say that it does not.

JACOBUS, R.F.C.

LITTLE SKETCHES IN PRE-WAR FRANCE.

II.—ROUND ABOUT PARIS.

AFTER breakfast at the "Café de la Grande Marquise," the breakfast being a large oily omelette, *café nature* (that is, denuded of alcohol in one pernicious form or another), a foot or so of honeycomb bread—the whole partaken of hungrily—after breakfast, I say, we walked out on to the Asnières Road, with pipes fuming happily, content to await the day, and knowing that what it held would be good. My friend, with whom I was taking this never-to-be-forgotten holiday, stalked serenely along, clad in a joyous masterpiece that represented some American tailor's nightmare of an English Norfolk jacket—a very Joseph of a coat. For myself, I looked a person to whom it would be correct to give a penny. Yet the polite stares of the amazed inhabitants of this little Paris river resort disturbed us not at all. We were here, at last, in the Promised Land; and what did clothes matter if a man had a few pounds, and enough English tobacco to render distant and negligible the day when one would have to smoke the pungent and terrible Scaferlati? What does anything matter when the demon of work has been exorcised for a few weeks, when one wanders — a gentleman at large —in sunny France.



The Palais de Justice, looking across the Seine.

Down the road, slowly meandering, accompanied by the queer, yearning twittering of his reed pipe, comes the goatherd with his erring flock, bearded dispensers of the morning milk, always on the verge of suicide under the clanging street cars that rattle by at all hours. A humped figure bumps by at hectic speed, a Frenchman with a *pavé*-proof spine on an antique 5-6 h.p. Peugeot, coil and accumulator complete. (We saw very few machines in France, and those mostly lamentably out of date; with the exception of one or two New Hudsons, which had very complete instructions on the tank explaining in French the use of the controls—a sensible idea.)

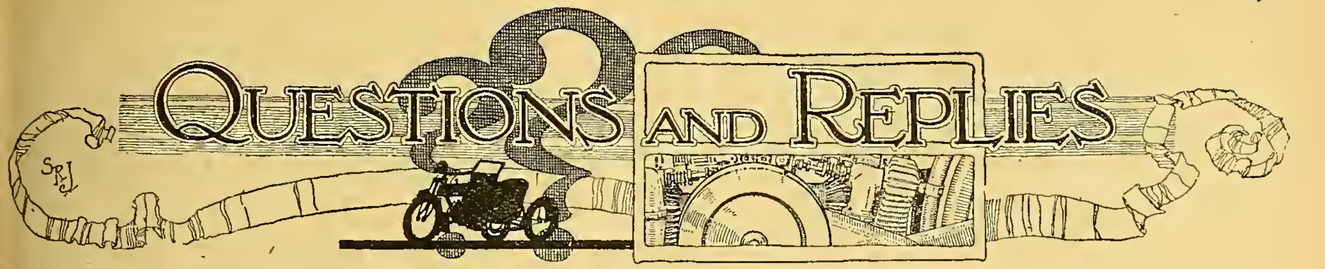
We stood at a street corner and lazily discussed what we should do. Should we horrify the fashionable ones on the boulevards with our pawn-shop get-up; should we laze a day in the Bois (dear Paris park, beloved of the bourgeois, and all the little bourgeoisie); should we stroll appreciatively round the Luxembourg galleries and tire ourselves? Perish that last thought on such a golden day! The river, then. A steam car thundered down the cobbled road: we climbed up to the three sou roof, where one can see and admire. The car jolted through the long squalor of Levallois Perret, past the gate of Asnières and the vigilant *octroi* officials, down tree-shaded avenues hemmed with tall white buildings, light and graceful, to the great church of the Madeleine.

The River Seine.

Here we clambered off, and essayed to cross the road. This is always an adventure. One had need of as many eyes as Argus to save one's skin. Across the desert-wide stretch of the Place de la Concorde, past the little shrivelled old woman who sells leathern cakes (yclept gingerbread) for two sous to adults and one sou to children, down the dip to the golden river, Seine, the river of bridges. Bas Meudon looked attractive on the prow of the steamer. Up the gangplank then, and there we sit, delightfully at ease among the heterogeneous Paris crowd, watching the water swirl away from us, the long green banks, the white buildings clotted together, the Eiffel Tower—"to Paris what a delicate tiara is to the head of a beautiful woman," as its designer said of it. I proposed that we should load up with eatables at whatever shops Bas Meudon might produce, and hie to the woods for the day. The peaceful river scenery glides by, broken now and then by tugs, belching smoke and flame, trailing strings of huge barges loaded with—cigarette papers, of all things. How many billion of the little things could there be on each barge? Why speculate, why not just enjoy? A fat *curé* opposite us blinks in the sun. Wherever one goes in Paris there is always a fat *curé*. Two chattering American girls near us load a kodak with fresh spools. On the bridge the mahogany-coloured pilot gazes sternly into infinity, and twirls his brass-bound spokes with the air of a Columbus.

On Happiness.

Then we bump heavily into a landing stage, placarded on every available square inch with advertisements, of things to eat, drink, sleep on, and what not. "Bas Meudon!" Up a steep hillside runs the funicular railway, half lost to view in the foliage. After securing provender, we are drawn to the top, where inviting green aisles beckon us. There, as happiness is an uneventful thing by the very nature of it (even perhaps a little dull!)—there leave us then, with the rabbits jumping about us, and the blue of the sky glimmering benignly through the tree tops.



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

A Loose Ball Bearing.

"Ixion" recently wrote that he was busy securing a loose ball-race in the aluminium case of a gear. I have the same trouble with my 4¼ h.p. motor cycle gear box, and would be grateful to hear of a permanent cure.—T.W.

If you pack the ball-race in with a thin strip of brass or even of brown paper, provided it is tightly fixed and the shafts are properly in line, there is no reason why the cure should not be a permanent one.

Piston Rings Breaking.

Can you suggest any reason why my 3½ h.p. single-cylinder 1911 Indian should break its piston rings? If driven hard it is possible to break them both in about thirty miles, but if driven carefully (*i.e.*, not all out for more than five minutes at a time) the rings break every 500 miles or so. They usually break in two places, about half an inch from the slot on either side. The engine behaves well in every other respect, and does not get exceptionally hot.—G.S.A.

The breakage of the piston rings may be caused by the rings being a bad fit or by overheating or partial seizure, due to an insufficiency of lubricating oil. Perhaps when you do drive "all out" you do not take the precaution of giving the engine an extra pumpful of oil.

Petrol for Soldiers on Leave.

I see by your paper that it is now possible to get a temporary permit to use a motor cycle and petrol. As I am expecting to be home on leave shortly, and should like to be able to use my outfit, I should be obliged if you would let me know how I can obtain the above.—S.E.P.

The course for you to adopt is to apply to the Petrol Controller, 19, Berkeley Street, London, W.1, asking for a temporary permit to be issued to you, and stating also the circumstances of the case in detail. It is advisable to begin this application at least three weeks or a month before you are likely to come home on leave, and you should state the date on which you are coming home and the dates between which you want the permit to operate. If you will be coming home in less than three weeks, the best course to adopt is to write the Petrol Controller, and tell him that you will call personally for the permit when you arrive in Town.

Carbide Consumption.

What amount of carbide would be necessary for 200 miles night work on a 2¾ h.p. Douglas in a very bad country, both as regards gradients and road surface? The average speed might be 15 m.p.h., probably often less. My lamp is a Lucas King of the Road—smaller set. The makers say the generator burns about four and a half hours—which I doubt. The 200 miles would not be ridden off at one stretch, but perhaps on seven or eight different nights.—W.H.M.

It is usually estimated that you can get three charges out of a 1 lb. tin of carbide, each charge lasting about four hours. Now, if you average 15 m.p.h. you may reckon that you would require just under one and a half tins. Two tins would be ample, and would make the necessary allowance for waste, as the burning is not to be continuous.

Dismantling an Engine.

Will you be so good as to help me? I am taking down the timing gear of my 1913 8 h.p. J.A.P., but am held up with the exhaust lifter, so will you please tell me: (1.) How to remove the exhaust lifter so as to be able to take off the rockers? (2.) How to clean carbon from the inside of the curved exhaust pipe? (3.) Would you give me the name and address of a repairer of petrol and drain taps, as mine leak badly? Or would you recommend new ones (if so, the name and address of makers would be acceptable)?—H.S.

(1.) We believe that the exhaust valve lifter in your particular model consists of a rack and pinion and a double cam. If you remove the timing gear cover, you should be able to pull away the pinion, together with the double cam and shaft, without difficulty. See the illustration on page 1365 of *The Motor Cycle* of October 23rd, 1913, a copy of which issue will be supplied to you for 7d. post free. (2.) We should recommend you to put the exhaust pipe in a brazing hearth and heat it red-hot. This would burn out a great deal of the oily carbon, or an oxygen flame, similar to that used in the Cylclean process, would clean it satisfactorily. (3.) Probably Messrs. Rotherham and Sons, Coventry, would repair the taps for you.

In submitting to the Editor articles, photographs, or drawings, contributors are asked to mention whether the illustrations are exclusive, and further to enclose a stamped addressed envelope for return of unaccepted contributions.

A Slipping Clutch.

I have a 3½ h.p. Triumph motor bicycle, and the three-speed Sturmey-Archer clutch does not act, although the gears work all right. Would you tell me how to adjust the clutch?—W.H.N.

It looks as if either the clutch plates are worn or the clutch requires to be washed out with paraffin and then thin oil inserted, or adjustment is required. The clutch should be adjusted so that there is about a quarter of an inch longitudinal movement before any definite resistance can be felt on the clutch pedal. The length of the long clutch rod should be adjusted so as to release the clutch with a minimum amount of movement of the pedal. Also make sure that your belt is not slipping.

Removing a Timing Pinion.

(1.) I am taking down a 4 h.p. 1915 Triumph, and find I cannot move either the wheel driving the cam wheels or the bearing on the pulley side of the engine. What method do you advise me to use to remove these? I have soaked both in paraffin for several days. (2.) Why does my screwdriver act as a magnet to screws placed on a magneto? It will lift small screws three inches immediately above the magnets, but they drop when they pass the edge.—M.E.B.

(1.) In the centre of the timing pinion there is a screw with a broad head. Use a large screwdriver, and, after exerting considerable force, you will find that this screw can be withdrawn. It is a cone-headed screw, and after it has been removed you will see a key. This should be knocked inwards, and then the timing pinion can be prised off with a couple of screwdrivers. The crank case is now free to be removed, and, if you desire to remove the ball bearing also, this can be knocked out with a piece of hard wood and a mallet. (2.) This does not mean that your screwdriver is necessarily magnetised. The screws undoubtedly are, since they are always in contact with the magnets of the magneto.

Mysterious Transmission Troubles.

My brother in India has a British twin motor cycle which is giving him considerable trouble. He writes: "(1) Neither the clutch nor the belt seems to me to slip, but something slips between the wheel on which are the clutch and belt and the gears. For some time I could move the gears without declutching, and my kick starter went round without moving the engine, but that eventually cured itself. (2.) In spite of the petrol and air proportions being correct, there being no leaks, and the fitting of a 16 jet, I sometimes only get 40 m.p.g., though at other times I get 60. Why should it vary? (3.) What would be a fair petrol consumption with sidecar?"—F.G.B.

(1,) We should imagine that your brother is mistaken in saying that it is neither the clutch nor the belt. If, however, he has conclusively proved that the trouble is in neither of these, then the fault must lie in the gears themselves, and it is impossible to state definitely what it is without inspection. From the description of the symptoms, however, we should imagine it is most probably a case of worn dogs, or bent striker arms or selector rods. (2 and 3.) As regards consumption, there is probably some mistake in the timing, if there are really no air leaks nor any petrol leak. The symptoms seem to suggest that there is a leakage in the feed system somewhere, which may occasionally become choked up, and consequently the consumption temporarily approaches normal, which should be about 60 m.p.g. with a .03 (or No. 30) jet.

Ball Bearing Trouble.

When last out with my motor cycle I was troubled with a grinding sound coming from the crank case. I could move the engine pulley, when the belt was off, with a considerable amount of play, up and down and sideways. I have taken the engine completely down. The ball race bearings are a tight fit in the recesses of the crank case on each side; there seems to be no play whatever in the bearings on the engine-shaft; and I have had the balls out of the ball races and put them back again after they had been thoroughly cleaned. I asked the advice of a motor mechanic, and he said they wanted packing in the crank case. I may mention the ball race nearest to the engine pulley had been revolving bodily in the recess. What I should like to know is—does the ball race want packing between the outside ring and the crank case, or between the side of the crank case and the side of the ball race? What would you suggest I should pack it with? As I have mentioned above, the ball race just goes into the recess, and is a tight fit at that. I possess most of your works dealing with motor cycling, but very little is mentioned about ball bearings.—A.J.W.

If you can move the engine-shaft up and down it is a sure indication that the bearings are worn. Certainly if the ball bearings have been revolving in the crank case they should be packed so that they cannot move. We should strongly recommend you to submit the engine to an expert, as it looks to us as if one of the ball bearings will have to be renewed. The packing should be round the outside of the ball race, so that it cannot turn in the crank case.

Mysterious Loss of Power.

My 5-6 h.p. Rudge-Multi sidecar, which used to be a splendid puller, now konks out on the slightest provocation. It has climbed Llanberis Pass, starting from Llanberis village, with heavy passenger and luggage without a knock, but now it would not do it solo. I have had it retimed—both valves and magneto—exactly to makers' specification, three times. This has been done with minute care, and is, I think, right. The engine is perfectly clean inside and out. The compression is not quite so good as it was. I can stand on the pedal, when it is horizontally placed, about twenty seconds, and it will drop a little. I have tried several size jets with no better results. There is no misfiring, and the engine starts readily enough. Exhaust pipe and silencer are quite clean. Change of plug makes no difference. No parts have been renewed, and there appears to be no tightness in the bearings. Only Prices' best air-cooled single-cylinder oil is used. The controls work smoothly, and engine will race madly "in free."—A Four Years' Reader.

It is exceedingly difficult to advance any helpful suggestions without seeing the engine. Have you tested the cylinder and the piston and made sure that excessive warp does not exist; also, have you tested the compression when the engine is hot? It might be that, when hot and expanded, compression is lost in some way, such as by a slight crack round one of the valve seatings or in some obscured portion of the cylinder. You might borrow, if possible, another magneto and try the engine with this fitted, and the same applies with regard to the carburetter. It is only by the process of elimination that defects of this kind can be located. We take it that you have carefully checked the valve tappet adjustment, valve lift, etc.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY

During 1918 the restriction on the import o' paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week.

Misrepresenting a Second-hand Machine.

A few months ago I bought a second-hand motor cycle. The agent from whom I bought it told me at the time of the transaction that it was a Calcott fitted with a 1914 J.A.P. engine. About a week ago I wrote the Calcott firm, and in their reply they told me that they had discontinued to make motor cycles a long time ago, also that they never fitted any J.A.P. engines—they have all been Calcott engines—and, being a novice, I consider I have been treated very unfairly. I paid half the money down and am paying the remainder in six monthly instalments And I think I am paying a very good price for the machine the agent was supposed to have sold me, provided there had been no falsehoods. I should be much obliged if you could answer me the following questions: (1.) Can I compel the agent to take the machine back, provided I take another one of the same value in exchange? (2.) Would it be wise to withhold any of the instalments, provided the agent will not allow me anything back on the motor cycle?—T.R.

(1.) We are afraid you can do nothing unless you have the incorrect description of the machine in writing, or have some other means by which you could conclusively prove the agent to have made this misrepresentation. If you feel that you could prove it in court to the satisfaction of a judge, you may then compel the agent to take the machine back without any stipulation as to your taking another one of the same value in exchange, and, of course, he would have to refund the money you have paid. (2.) You certainly would have no justification for withholding the instalments, as you suggest.

READER'S REPLY.

A Leaky Petrol Tank.

When you want to repair a petrol tank, fill it three or more times with water to overflowing, which will expel all the petrol gas, and you can then solder with perfect safety. Dry afterwards, of course. In case anyone doubts this, the fact that I am able to write will prove that I have not been exterminated while repairing tanks, of which I have done several.—Edgar Evans.

RECOMMENDED ROUTES.

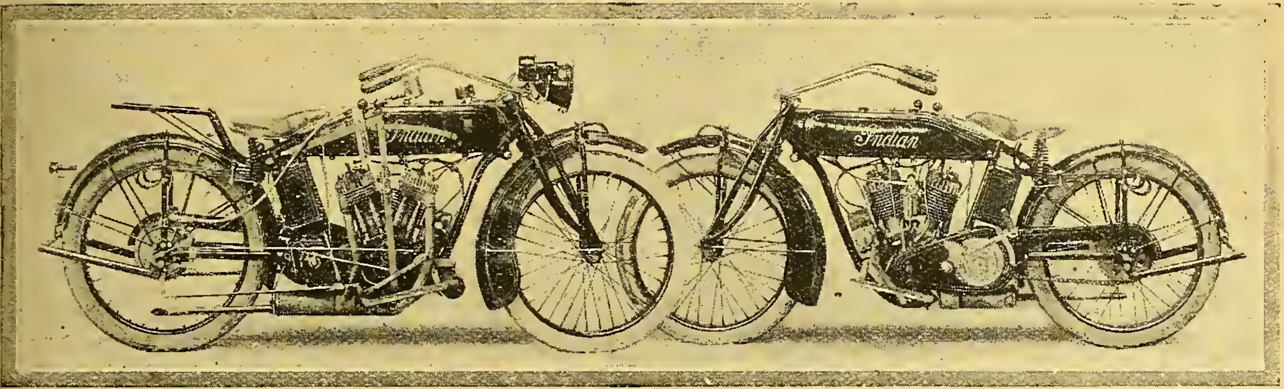
Plumstead to Forest Row.—E.K.

Make your way from Plumstead to Woolwich Common, Eltham, Mottingham, Bromley, West Wickham, Shirley, Croydon, Purley, continue through Godstone, Blindley Heath, and East Grinstead to Forest Row. Approximately 53 miles.

Sunderland to Scawfell and the Lakes.—J.R.L.

Sunderland, Gateshead, Newcastle, Bladon, Hexham, Alston, Penrith, along the shores of Ullswater, over the Kirkstone Pass (which should be negotiable by all modern machines), to Ambleside. Scawfell lies practically due west of Ambleside.

1918 Powerplus *Indian* Motocycles



Which we trust will be Post-War Models.

We regret that we are not in a position to supply motorcycles or send out catalogues at the present time, but when we are able to do so we will freely advertise the fact. This applies to Great Britain only.

"Indian Motocycle" Hendee Manufacturing Co.

HENDEE MANUFACTURING CO.,
"Indian House," 366-368, Euston Road, London, N.W.
Telephone: Museum 1648.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA, 109-113, Russell St., Melbourne.
CANADIAN WORKS, 12-14, Mercer St., Toronto.
AFRICA, Indian House, 127-9, Commissioner Street, Johannesburg.
Indian House, 579, West Street, Durban.
Indian House Strand Street, Port Elizabeth.

Bowden Wire Ltd:

London
VICTORIA ROAD
WILLESDEN JUNCTION
N.W.10

THE varied uses and adaptations of Bowden Wire mechanism are recognised by almost every department of State Service. The war work which we have in hand for Home and Allied Governments precludes for the present our acceptance of private orders

Established 1897.

CAUTION.

See that the name 'FOX' is on the metal discs (right and left) attached to every genuine pair of FOX'S New Non-Fray Spiral Puttees, thus—

Patentees & Sole Manufacturers—
FOX BROS. & Co., Ltd., (Dept N
Wellington, Somerset.

FOX'S "F.I.P." PUTTEES

NEW NON-FRAY SPIRAL

Patented.

Regulation Heavyweight 7/6 per pair.

Extra fine Lightweight 9/- per pair.

Agents for United States.—
Manley & Johnson, 260-265, West Broadway, New York, U.S.A

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns —First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller. but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S., 6h.p., latest model in stock.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [X1662

A.J.S. Spares: prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

A.J.S. Combination, 4h.p., 1916, perfect condition; £70.—Slater, 26, Yarrow Gate, Chorley. [3422

FOR Sale, 2¾h.p. 1916 A.J.S., cylinder and piston new; what offers?—J. Forbes, Beragh, Co. Tyrone. [3427

1917 6h.p. A.J.S., War Model, complete Lucas lamps, horn, etc., done only 200 miles; £85.—Box 1,704, c/o *The Motor Cycle.* [X1897

A.J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

A.J.S., 1913, 2¾h.p., hand clutch, 2-speed, lamps, horn, spares; £25, or near offer.—Propellants, H.M Factory, Barton, Manchester. [X1810

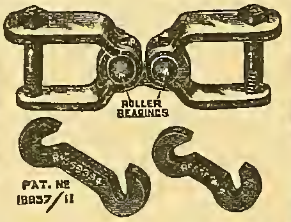
6h.p. 1914 A.J.S. Standard Coachbuilt Combination, perfect order and condition; £55, or nearest.—Townsend, Oundle, Northants. [X1744

1916 A.J.S. 6h.p. Combination, Lucas dynamo lighting set, hood, screen, side curtains, storm apron, spare wheel, recently overhauled by makers, in excellent condition; £95; appointment only.—F. Giles, Woodfield Av., Penn, Wolverhampton. [X1748

Making two ends meet—

is a function performed successfully, all the time, by "the fasteners that never fail" — the

FORWARD



The KING HOOK.

Detachable 1/-. Adjustable 1/3

They hold the ends of the belt together under all conditions, and their roller bearings and exceptionally strong steel links ensure a service quite superior.

They are, in short, a detail which will enhance the efficiency of your machine materially.

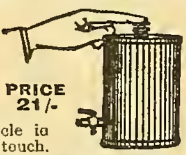
Why not test them?

FORWARD MOTOR CO.,
Forward Works, Summer Row,
BIRMINGHAM.

1152

THERE'S ONLY ONE: ITS NAME IS

THE EUK EASY STARTER



PRICE 21/-

Fitted to any Motor Cycle in 10 minutes. Operated by a touch. Gives perfect instantaneous easy starting. Over 33,000 in use. Details free from—

ALEXANDER & CO., Dept. B, 115, Lothian Road, EDINBURGH; 274, Gt. Western Road, GLASGOW.

DEFENCE OF THE REALM ACT

Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S., 1914, 2-speed, clutch, and K.S., all-chain drive £37/15; 1913 model, £35; E.P. or exchange.—Th Service Co., 292, High Holborn, W.C.1. [X192

A.J.S. Motor Cycles.—Immediate delivery of the ver latest 6h.p. models from stock. — The A.J.S Specialists, The Walsall Garage, Walsall. Tel.: 444. [X987

A.J.S. Motor Cycles.—Immediate delivery of specia 1917 model, complete, detachable wheels, 700 80 tyres; £91/6; trade supplied; no permits required —P. J. Evens, Sole Agent for Birmingham and dis trict. [X065

A.J.S., 6h.p., and sidecar, with wind screen, lamp, an horn; this is one of the latest 1915 models turne out, as it left the works in October, 1915. The outfi has been thoroughly overhauled and revarnished, an is practically equal to new in every possible respect price only 80 gns.—Julian, 84, Broad St., Reading Biggest light car and motor cycle dealer in the Sout 'Phone: 1024. Closed Wednesdays 1 o'clock. [073

Alldays.

ALLON.—All new models; E.P. or exchange.—Servic Co., 292, High Holborn, W.C.1. [X191

ALLDAYS 2-stroke Motor Cycle; £16/10; sellin owing to owner been joined up nearly three year —Apply to Blanshard, Keadby, Doncaster. [326

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-spee countershaft models in stock. [104

ARIEL Motor Cycle and sidecar, late model, counte shaft 3-speed gear, new gear box recently fitte by Ariel Co.; owner gone abroad; offers wanted.—W E. Clark and Co., Motor Engineers, Doncaster. 'Phone 176. [341

Auto-Wheels.

AUTO-WHEEL, B.S.A., good condition; 7 gns.; woul sell parts.—Fairholme, Coulsdon Rd., Caterham [X185

GENUINE Wall Auto-Wheel, little used, complete £8/10.—Murray, 37a, Charles St., Hatton Garde Holborn. [X188

WALL'S Auto-Wheel, practically new, £9.—Rober shaw's Wire Mattress Works, Arthur St., Corn brook, Manchester (near Northumberland Arms). [X190

Bat.

6h.p. Bat, 1915 model, twin-cyl. J.A.P. engine, 2-spee gear, round tank, countershaft gear, Bosch mag £45.—Seen at Wauchope's, 9, Shoe Lane, London. [350

Bradbury.

BRADBURY, 1912, 3½h.p., good running order; £ —Box 1,703, c/o *The Motor Cycle.* (D) [34

BRADBURY, 1912-13 3½h.p., 3 speeds, and coac built sidecar; £35/10.—Motor Exchange, Hort St., Halifax. [34

Brough.

BROUGH 1916 Model, 2-speed, including lamp; gns.; this machine is one of the greatest bargai offered.—Julian, 84, Broad St., Reading. Biggest lig car and motor cycle dealer in the South. 'Phon 1024. Closed Wednesdays 1 o'clock. [07

BROUGH 1916 model, 3½h.p. horizontal twin, speed countershaft Sturmey-Archer gear, h.b.c., f engine, clutch, and kick starter, semi T.T. bars, La accessories, warning signal, Dunlop tyres, nice all-rou smart condition; £57/10.—Seen at Wauchope's, 9, Sh Lane, London. [35

MOTOR CYCLES FOR SALE.

Brough.

ROUGH, 1915, 3½h.p., 2-speed countershaft £42/15; 1916, £55; ditto combination, practically , 77 gns.; E.P. or exchange.—Service Co., 292, High born, London. [X1935

B.S.A.

12-3 B.S.A., 2-speed and free, excellent order. Binks, Bosch, Dunlops; £26.—43, Hunter Hil , Sheffield. [X185

.S.A. Combination, 4¼h.p., 1915, all accessories; price £45, or will exchange for a 2¾h.p. Douglas. pply, E. Longhurst and Sons, Steam Saw Mills om, Surrey. [X190

.S.A. 1916 Combination, 4¼h.p., countershaft, 3 speed, chain-cum-belt, canoelet sidecar, good condition; 60 gns., or nearest offer.—Tromans, Perry Park , Blackheath, Birmingham. [3519

.S.A., 1915, 4¼h.p. countershaft model, includes handsome coachbuilt sidecar, spare petrol tank, edometer, and all accessories; £55; grand oppor ity.—Seen at Wauchope's, 9, Shoe Lane, London one: 5777 Holborn. [3506

Calthorpe.

ALTHORPE-J.A.P., 2¾h.p.; £15, bargain.—Seen a Wauchope's, 9, Shoe Lane, London. [350

EW 2¾h.p. Calthorpe-J.A.P.'s from £32; specifications on application.—Wauchope's, 9, Shoe Lane don. [350

ALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits uired.—P. J. Evans, 91, John Bright St., Birming [X0654

Chater-Lea.

HATER-LEA Latest Model 8h.p. Combination, complete, 3-speed gear box, Lucas lamps and horn, urious Gloria coachbuilt sidecar, hood, apron, etc., dition practically new, run about 800 miles; cash .—Full particulars, Messrs. Chater-Lea, Banner St., don, E.C. [3476

Chater-Jap.

HATER-J.A.P., 1914, 2½h.p., 3-speed, clutch, lamps, horn, new wings, in good running order; £20.—11, erset Rd., Kingston-on-Thames. [3416

Clyno.

14 5-6h.p. Clyno Combination, 3-speed, detachable wheels, screen, all accessories, excellent condi very little and careful use; £55.—Withers, Made Shropshire. [X1906

h.p. Clyno Combination, 3-speed, detachable wheels, spare wheel and tyre, and all accessories, hood screen, reliable in every way; unprecedented bargain £65.—Wauchope's, 9, Shoe Lane, London. [3509

LYNO, 6h.p., with No. 6 and commercial sidecars, every latest improvement, enamelled Service green, l and varnished, all in perfect condition, picked ne, complete with spare wheels and accessories; .—67, Gordon St., Wolverhampton. [X1743

Connaught.

ONNAUGHT Miniature, 2½h.p., single, new, £33/10; 2-speed countershaft, new, £41; standard 2-speed, , £44; E.P. or exchange.—Service Co., 292, High born, London. [X1938

Douglas.

14½ 3½h.p. Douglas, 2-speed; what offers?—Shoda, Bellerby Terrace, West Hartlepool. [X1620

OUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

12 Douglas, overhauled, rebushed, as new, fast; £20.—Box L5,568, c/o *The Motor Cycle.* [3429

OUGLAS, 1915, 2¾h.p. W.D., in new condition; £45.—Apply, T. E. Davies, Pixley Court, Ledbury. [3258

OUGLAS, single speed, good condition and order; 10 gns., cheap.—Higgins, 66, Malvern Rd., Gilling [3415

OUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, vil. Tel.: 50. [5855

15 Douglas, 2¾h.p., 2 speeds, T.T. bars, excellent condition; owner on service; £38, or near offer. arnshaw, Cloth Hall St., Huddersfield. [X1856

OUGLAS, 1914½, 2¾h.p., 2-speed, T.T. bars, switch, long exhaust, lamps, splendid condition; £32.— ckinnon, 137, Russell Av., Wood Green, N.22. [3474

OUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, Douglas agent, 196, Cheltenham Rd., Bristol. [0923

15 2¾h.p. Douglas, U, semi-T.T. bars, footboards, Amac carburetter, excellent order, lamp, horn, s, etc.; £35.—Robinson's Garage, Green St., Cam ge. [3333

OUGLAS, 1913, 2-speed, Bosch mag., £32/10; Model V, practically new, issued late 1917, £57; . or exchange.—Service Co., 292, High Holborn, .1. [X1922

17 2¾h.p. Douglas, Model W, hand-controlled clutch, kick start, latest improvements, £54, plus ; also Models U and V, 1916 specification, £50, 10%, absolutely new; immediate delivery against rity permits for doctors, farmers, war and muni workers; how and where to apply.—Full particulars. e, Douglas Specialists, Robinson's Garage, Green St., bridge. [3332

IF IN NEED OF A Motor Cycle or Combination

EITHER FOR WAR WORK or BUSINESS PURPOSES,

WRITE TO

GODFREY'S LTD.

They can supply you from stock, and you can rely on getting value for your money.

SEND FOR FULL LIST OF NEW AND SECOND-HAND MACHINES.

EASY TERMS.

GODFREY'S LTD.

208, Gt. Portland Street,
LONDON, W.1.
'PHONE: 7091 MAYFAIR (2 Lines).

ROBBIALAC

Prices

WE regret that, owing to increases in cost of tins, labour, etc., we are compelled to make the following slight advances in prices as from 1st Jan. 1918:

Robbialac Enamel.

		Extra for postage and packing.
Cycles - - - -	1/9 tins	6d.
Motor Cycles - -	2/3 „	8d.
Tricars - - - -	4/6 „	9d.
4-seater Cars - -	8/- „	11d.
Large Motor Cars -	15/6 „	1/5

Robbialac Brushes.

			Extra for postage and packing.
Robbialac Brushes	1in.	1/1	4d.
„ „	1½in.	1/6	„
„ „	2in.	2/1	„
„ „	2½in.	2/6	„
„ „	3in.	3/3	„

Sold by all Dealers.

Sole Manufacturers of Robbialac:
Jenson & Nicholson, Ltd.,
Stratford, London, E.15.

MOTOR CYCLES FOR SALE.

Douglas.

DOUGLAS, 1913, 2-speed, Bosch, Amac, footboards, head lamp, good condition; £25, or near offer; must sell, owner joining army.—Hyams, 47a, Picton St., Camberwell. [3487

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1915 2-speed Douglas, £42/10.—Motor Exchange, Horton St., Halifax. [3445

1914¾ Model V. 2¾h.p. Douglas, 2in. exhaust, speedometer, lamps, and horn, excellent condition; 32 gns., or exchange higher power, cash adjustment.—Oakroyd, Potters Bar. [3426

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1914 Douglas, 2¾h.p., 2-speed, clutch, kick start, 34 gns.; many Douglas parts in stock, including complete engine. (D) [3387

1917 2¾h.p. Douglas U, 3-speed, nearly new tyres, footboards, upturned bars, left works June, 1917, very low mileage, perfect condition; £48.—Robinson's Garage, Green St., Cambridge. [3334

Enfield.

NEW Royal Enfield, 2¼h.p., 2-stroke, 2-speed models from stock; £44/2; cash or extended payments.—Wauchope's, 9, Shoe Lane, London. [3510

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

ENFIELD Combinations from £55; complete sidecar outfits, including tools and accessories; inspection invited.—Wauchope's, 9, Shoe Lane, London. [3511

1915 Enfield Combination, speedometer, lamps, etc.; owner been in France for two years; perfect condition; £57/10.—Bruce Wood, Horn Park Farm, Lee, S.E.12. [3436

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X1928

ROYAL Enfield 3h.p. Twin, late 1915, Palmer cords (unpunctured), Lucas lamp and horn, spare valves and Renolds chain, full tank of petrol; owner posted; £40 nett.—Collier, Runcton, Chichester, Sussex. [X1884

1916 Enfield Combination, 6h.p., fully equipped, with lamps, horn, speedometer, screen, and hood, mileage about 4,000, perfect, and unscratched condition; £80.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0552

ENFIELD Late 1917 6h.p. Combination, mileage 800, screen, special mudguards, special back tyre, lamps, mechanical horn, and all accessories, well looked after, could not be detected from brand new; complete, cash price £92.—Thomas, Cloth Hall, St. Clears. [3431

WAR Bargain.—1916 twin Enfield, 3h.p., chain drive, 2-speed, kick starter, M.A.G. engine, beautiful order and condition, unused during 1917, new tyres 1918, guaranteed perfect; first £35 secures, or with Featherweight Canoelet sidecar £41; seen Yorks.—Box 1,692, c/o *The Motor Cycle.* [X1852

ROYAL Enfield, 3h.p., all-black, 2-speed, 1914-15, condition as new, only done 5,500 miles, tyres unpunctured, overhauled by makers last year, kick starter 1916 pattern, Jones trip speedometer, Lucas lamps and horn, watch, all spares; £45 spot, no offers. —Phippen, 18, Cornwallis Crescent, Clifton, Bristol. [X1874

Harley-Davidson.

1917 Harley-Davidson Combination, dynamo lighting, coach sidecar; £130; exchanges entertained.—Mitchell's Garage, Roundhay Rd., Leeds. [X1156

HARLEY-DAVIDSON Combination, 1916 model, includes coachbuilt sidecar and all accessories; price £75.—Wauchope's, 9, Shoe Lane, London. [3493

HARLEY-DAVIDSON, olive green electric model, speedometer, absolutely new condition throughout, only run few miles; £95.—Box L5,497, c/o *The Motor Cycle.* [3094

1917 Harley-Davidson Combination, magneto model, lamps, horn, splendid condition throughout; £115.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0551

HARLEY-DAVIDSON Combination, 1915, electrically equipped, aluminium disc wheels all round, hood and screen, etc.; £75; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1916

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1924

HAZLEWOOD 5-6h.p. Combination, 1914, 1915 countershaft 3-speed gear, free engine and kick starter, handsome coachbuilt sidecar included; £47/10; bargain for immediate cash.—D'Armand, c/o Wauchope's, 9, Shoe Lane, London. [3494

Humber.

2¾h.p. Twin Humber, 1913, good condition; £15/10. —27, Maybury Rd., Woking. [3458

HUMBER Lightweight, good order, lamps; £12.—Green, 3, Aberdeen Villas, Chase Rd., Old Southgate. [X1851

MOTOR CYCLES FOR SALE.

Humber.

HUMBER, 3½h.p., single speed, £11/10; 3½h.p., 2 speeds, £19/10.—Motor Exchange, Horton St., Halifax. [3447

1915 Humber. 3½-4h.p., mag., 3 speeds, clutch, kick, lamps, nearly new; sacrifice 38 gns.; part exchange lightweight.—1, Ebner St., Wandsworth. [3490

Indian.

INDIAN 1915, 5h.p., 3 speeds, fully equipped, equals new, run 500 miles only; £50.—Below.

INDIAN 1914 7-9h.p. 2-speed Combination, electric equipment, in real nice condition throughout; £36.—Percy and Co., 337, Euston Rd., London. [3338

INDIAN, 5-6h.p., with coachbuilt sidecar; trial; £20, no offers.—Ellard, 437, West Green Rd., Tottenham, N.15. [3518

RED Indian, 1915, 3-speed, clutch, kick starter, good tyres, accessories, just overhauled by Godfreys, splendid condition; best offer.—Wilson, The Gun, Bramcote, Notts. [3421

James.

1917 2-stroke James, complete with lamps, horn, etc.; £37.—Cross, Jeweller, Rotherham. [X1898

JAMES, 1914, 4¼h.p., single-cyl., 2-speed countershaft, clutch, chain drive, T.T. bars; £25 for quick sale.—Box 1,696, c/o *The Motor Cycle.* [X1833

1915 James, 2¼h.p., 2-stroke, 2 speeds, accessories, etc., little used, splendid condition; solid value, £33.—Full particulars, Northwood, Cleobury Mortimer, Shropshire [X1746

JAMES 4¼h.p. 1917 Combination, absolutely new, bought 3 weeks ago; cost over £100; ridden only 36 miles, the property of an officer going to sea; price for immediate sale £87, no offers.—Glenartney, Lee-on-Solent. [X1944

JAMES, all models, new and second-hand; extended payments or exchange; specially built 5-6h.p. combination, dynamo lighting, finest combination ever turned out, £120.—Service Co., 292, High Holborn, London, W.C.1. [X1917

Levis

LEVIS, 2½h.p., late 1916, in perfect condition; £27. —Bruce Wood, Horn Park Farm, Lee, S.E.12. [3435

2h.p. 2-stroke Popular Levis, in good sound mechanical condition, tyres also perfect; £20; opportunity. —Wauchope's, 9, Shoe Lane, London. [3495

LEVIS, 2½h.p., 1916 model E, 2-speed, all-chain drive, T.T. bars, mechanical horn, head lamp, generator, rear lamp, Avon studded tyres, machine as new, unscratched, all tools; bargain, £33/10.—Mebes and Mebes, 156, Gt. Portland St., W.1. [3477

Matchless.

1913 Matchless O.B. Combination, 6-8h.p., excellent condition; £28; no dealers.—Box L5,596, c/o *The Motor Cycle.* [3473

MATCHLESS Latest War Model Combination, complete with detachable wheels, spare wheel and tyre; £120.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3523

7h.p. Matchless Sidecar Outfit, complete with all accessories, M.A.O. engine; offers wanted; inspection at any time.—Grose, Ltd., Marefair, Northampton. [X1641

MATCHLESS 8h.p. Combination, new, fitted with J.A.P. or M.A.G. engines; extended payments or exchanges.—Service Co., 292, High Holborn, London, W.C.1. [X1918

MATCHLESS Combination, War Model, new last August, with lamps, horn, and speedometer, run 1,500 miles, in excellent condition; £105.—J. Sims, Longfields, Kent. [3432

7-9h.p. Matchless, M.A.G. engine, 3-speed countershaft gear, clutch, and kick start, semi T.T. bars, sporting type of coachbuilt sidecar attached, machine is suitable for solo or sidecar use; £75, includes accessories.—Seen at Wauchope's, 9, Shoe Lane, London. [3501

Monopole.

MONOPOLE, 1916, 2½h.p., 2-speed, free engine, hand clutch, Albion gear, lamps, separate generators, footboards, E.I.C. mag., Bates tyres nearly new, chain-cum-belt, very light torpedo (cane) sidecar, 3-point attachment, new rim, nearly new tyre (Bates), perfect order, spare cover, tubes, and belt, tools; exchange higher power combination; what offers?—C. Moseley, Dixon Ground, Coniston. [X1483

Moto-Reve.

2¼h.p. Moto-Reve, variable pulley, good condition, new belt and tyre, engine perfect, spares; £10, or nearest.—Dakeyne, Cheadle, Staffs. [3467

New Hudson.

NEW Hudson, 1916, 2¼h.p., 2-stroke, 2-speed, electric lamps; £27.—Drummond, 16, Jesmond Rd., Newcastle-on-Tyne. [X1875

1915 New Hudson, 2¼h.p., 2-stroke, just overhauled, nearly new back tyre, new Dunlop belt, lamps, horn, etc.; £20.—Chapman, School House, Shottenden, Chilham, Kent. [X1945

New Imperial.

CROW Bros., Guildford.—New Imperial, latest 2½h.p., 3½h.p., 6h.p. models in stock · also sound second-hands. [1047

Rider Troward & Co

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DOUGLAS, 1914, 2¾ h.p., 2-sp., T.T., fine order	**33 gns.**
ENFIELD, 1915, 3 h.p., 2-sp., clutch, k-start	**33 gns.**
ENFIELD, 1917, 3 h.p., 2-sp., clutch, k-start	**42 gns.**
HARLEY, T.T., 7-9 h.p., 3-sp., disc wheels	**63 gns.**
INDIAN, 1914, T.T., 7-9 h.p., clutch	**29 gns.**
INDIAN, 1914, 7-9 h.p., 2-sp., spring frame	**34 gns.**
INDIAN, 1915, 7-9 h.p., T.T., clutch	**36 gns.**
INDIAN, 1915, 7-9 h.p., T.T., clutch, disc wh.	**38 gns.**
LEA-FRANCIS, 1915, 3½ h.p. twin J.A.P., c-ft.	**48 gns.**
M.A.G., 1916, 3½ h.p. twin, 2-sp., clutch, k/st.	**43 gns.**
NORTON, 1915, T.T., Philipson	**36 gns.**
NORTON, 1916, T.T., Philipson, very fast.	**48 gns.**
RUDGE-MULTI, 1917, 3½ h.p., clutch	**46 gns.**
RUDGE-MULTI, 1916, 3½ h.p., clutch	**42 gns.**
RUDGE-MULTI, 1914, 5-6 h.p., clutch	**34 gns.**
RUDGE-MULTI, 1913, 3½ h.p., clutch	**32 gns.**
RUDGE-MULTI, 1913, 5-6 h.p., clutch	**29 gns.**
RUDGE-MULTI, 1913, 3½ h.p., T.T., clutch	**27 gns.**
SCOTT, 1913, 3¾ h.p., 2-sp., clutch, kick-st.	**29 gns.**
SUNBEAM, 1916, 3½ h.p., 3-sp., clutch, k.-st.	**65 gns.**
TRIUMPH, special 1914 T.T., cl., Philipson	**32 gns.**
TRIUMPH, 1914, T.T., clutch, red finish ..	**29 gns.**
TRIUMPH, 1914, 4 h.p., 3-speed	**34 gns.**
TRIUMPH, 1913, 3½ h.p., 3-speed	**29 gns.**
ZENITH, 1916, 4-5 h.p.	**56 gns.**
ZENITH, 1913, 6 h.p.	**32 gns.**
ZENITH, 1914, 4 h.p.	**29 gns.**

Any machine sent on *The Motor Cycle* Deposit System.

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MOTOR CYCLES FOR SALE.

New Imperial.

IMPERIAL-J.A.P., 2-speed, clutch model, £32/10; all new models in stock; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1920

NEW Imperial-Jap, 8h.p., 3-speed War Model combination; 109 gns.; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3521

NEW Imperial Motor Cycles, 2 speeds, clutch and kick starter, and lady's models in stock for immediate delivery; trade supplied; no permits required. —P. J. Evans, 91, John Bright St., Birmingham. [X0655

Norton.

NORTON Big 4, all-chain drive Military Model; £82. —Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3524

1916 T.T. Norton, speedy, in condition like new; 55 gns.—Seen at Wouchope's, 9, Shoe Lane, London. [3502

NORTON.—Big 4 Military Model, all-chain, new; also chain-cum-belt; £57/10; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1925

N.S.U.

HAVING Acquired the entire stock-in-trade of the N.S.U. Motor Co., Ltd., we can supply spares for practically all types of N.S.U. motor cycles. In ordering it is important to submit old parts as patterns.—Eagles and Co., Acton Hill Works, Acton, W.3. [X1891

N.U.T.

LATEST Model N.U.T., 3½-4h.p., free engine, 3 speeds, kick start, J.A.P. engine, like new; £40, complete.—Miller, 62, Hampstead Rd., N.W. [3147

P. and M.

P. and M., 3½h.p., 2 speeds and sidecar, underslung chassis; £22/10.—Motor Exchange, Horton St., Halifax. [3448

Premier.

PREMIER, 1914, 3½h.p., 3-speed, clutch, and K.S., Stewart speedometer, lamp, and horn, £34/15; 1916 combination, £61/15; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1913

Radco.

RADCO, 1915, 2-speed, 2-stroke, 2¼h.p., good appearance; £21/10.—Motor Exchange, Horton St., Halifax. [3449

Rex.

REX 1911 6h.p. Twin, mechanical overhead inlet valves, Bosch mag., Druids, splendid order throughout; £18.—49, Renmuir St., Tooting. [X1832

MOTOR CYCLES FOR SALE.

Rover.

ROVER.—All new models supplied; E.P. or exchange. —Service Co., 292, High Holborn, London. [X1919

3½h.p. Rover, countershaft model, fitted with a genuine Rover coachbuilt sidecar, 3 speeds; the combination 55 gns.—Seen at Wauchope's, 9, Shoe Lane, London. [3503

ROVER, 3½h.p., new March, 1914, 3-speed, lamps, tools, and wicker sidecar, all in good running order, been little used; £28.—S. Taylor, Low Haining, Houghton-le-Spring, Fence Houses. [X1885

CASS'S Motor Mart, Ltd., have for sale a Rover, 1917, 3-speed countershaft, 3½h.p., Lucas lamp set, speedometer, mechanical horn, new condition; £57/10.—5, Warren St., Euston Rd., W.1. Museum 623. [3419

ROVER Motor Cycles, 3½h.p. and 5-6h.p. models, in stock for immediate delivery, both solo and sidecar outfits; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [X0653

1917 Rover, T.T., Philipson; this machine is indistinguishable from new—in fact, it is in better condition than a new machine, only done 500 miles; price 50 gns.—Julian, 84, Broad St, Reading. Biggest light car and motor cycle dealer in the South. 'Phone: 1024. Closed Wednesdays 1 o'clock. [0737

Royal Ruby.

ROYAL Ruby.—All new models supplied; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1926

Rudge.

1917 Rudge Multi, 3½h.p., free engine, kick start, semi T.T. bars includes tools and accessories, and like new; £55.—Seen at Wauchope's, 9, Shoe Lane, London. [3496

Scott.

SCOTT, 1913, Bosch mag.; £37/10; 2-speed, clutch, and kick starter; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X1921

Sun.

SUN-VILLIERS, 2½h.p., 2-speed coupntershaft, new, £37/16; V.T.S., single speed, new, £30/10; 1916 2½h.p., 2-speed, £28/10; E.P. or exchange.—Service Co., 292, High Holborn, London. [X1937

Sunbeam.

SUNBEAM, 3½h.p., late 1915, with Grosvenor sidecar, all fittings, perfect condition, nearly new tyres, Dunlops, spares, tools; £60.—Woolfenden, 153, Bury New Rd., Heywood. [3483

SUNBEAM Combination, 1916, 8h.p., Lucas dynamo lighting set, electric horn, speedometer, wind screen, perfect condition, little used; £120; reasonable offer considered.—Long, Thornhill, Wardle Rd., Sale, Cheshire. [3250

1917 3½h.p. Sunbeam, fitted with Sunbeam coachbuilt sidecar, 3-speed countershaft gear, kick starter, h.b.c. clutch, fitted with all the best Lucas accessories, including speedometer and tools, beautifully finished, and luxuriously upholstered; the combination complete, which is in condition like new, £97/10.—Seen at Wauchope's, 9, Shoe Lane, London. [3497

Swift.

SWIFT and C.B. Sidecar, 1915-16, 3½h.p., clutch, and K.S., complete with lamp and horn, splendid condition; £49/10; E.P. or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X1923

Trump.

TRUMP-J.A.P., 3½-4h.p., footboards; £19; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X1915

Triumph.

TRIUMPH Motor Cycles.—For bargains call at Wauchope's, 9, Shoe Lane, London. [3498

TRIUMPH, 1912, 2-speed, excellent condition; £25. —Box 1,669, c/o *The Motor Cycle.* [X1809

TRIUMPH, 1909-10, 2-speed, and free engine, in good running order; £16/10.—Box 1,689, c/o *The Motor Cycle.* [X1830

1916 2¼h.p. Junior Triumph, with all accessories, lamps, horn, tools, etc., nearly new; £46.—Robinson's Garage, Green St., Cambridge. [3335

TRIUMPH, 3½h.p., £17/10; 1912-3, Bosch mag., S.A. free-wheel clutch, £26/10; E.P. or exchange. —The Service Co., 292, High Holborn, W.C.1. [X1914

TRIUMPH, 1913-14, 3-speed S.A., F.E., No. 10 Montgomery C.B. sidecar, unused since thoroughly overhauled at works.—Oakford, 12, Starley Rd., Coventry. [X1675

1912-13 Triumph, with wicker sidecar, new back tyre and tube, valves and belt, Grado gear, Lucas lighting set, Klaxon horn, mirror, and back-rest, guaranteed throughout; £27, carriage paid.—4, Gaywood Rd., Walthamstow. [3489

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1914 Triumph, 4h.p., 3-speed, underslung coach sidecar, 42 gns.; solo, 36 gns.; 1913 3-speed Triumph, 31 gns.; 1913 2-speed Triumph combination, 29 gns.; 1914 T.T. Triumph, red finish, clutch model, 31 gns.; 1914 T.T. Triumph, Philipson, clutch, 33 gns.; 1913 T.T. Triumph, bargain, 23 gns.; 1911 standard Triumph, 15 gns.; Triumph spares in stock, from 1907 up, including 1914 4h.p. engine. (D) [3390

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A posse ad esse
AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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SOUTH AFRICA—Central News Agency, Ltd. PARIS—Smith's English Library, 248 Rue Rivoli.

The Rules of the Road and of the Footpath.

IN this country, unlike most others, wheeled traffic keeps, or is supposed to, to the left. The rule, of course, has to be observed in towns, but in the country motorists will have noticed that among horse drivers especially the rule is more honoured in the breach than in the observance. This fact has so deeply impressed itself on the minds of some persons, that it has been suggested that there must be some definite reason for this persistent desire to keep to the right, and that as it appears to be more natural to do so the rule of the road in this country should be altered and brought in to line with America and the principal countries in Europe.

Those who have motored abroad, however, may remember that in the open country in France it is just as usual to see a carter driving on his wrong side of the road as in England.

It is a curious fact that a driver cannot be prosecuted merely for disobeying the rule of the road, but, naturally, if while transgressing he should cause an accident it would go hard with him. Now, while we drive to the left in this country, we are supposed to keep to the right when walking. The rule of the footpath is a very free and easy sort of affair; few people are aware of its existence, and those who are generally forget it. One has only to watch the throng of people on a crowded pavement to note that no rule at all is observed—some keep to the right, some to the left, but most to the side nearest the shop windows. No one enforces the rule of the footpath, not one cares how often it is broken, nor if a person through keeping on his wrong side stumbles into another man and knocks him down. In such a case one cannot imagine a magistrate asking the offender whether he had kept to the right or not.

A pedestrian is not bound to walk on the pavement or footpath, but is quite at liberty to walk on the road should he choose to do so, and if he is on the highway wheeled traffic must avoid him. It will be seen, therefore, that the pedestrian is a privileged person, as he is at liberty to roam at will on the road, while if an unfortunate motor cyclist rides for a few yards on the empty pathway to avoid a section of unrolled metal he is liable to prosecution.

It would obviously be fairer to make it law that pedestrians should only walk on the road at their own risk, except when actually crossing or about to cross it, or in cases where there is no footpath. Theoretically it is quite wrong that foot passengers should keep to the right, since those walking on their own side and close to the edge of the pavement are progressing next to and in the same direction as the wheeled traffic in the road, consequently a pedestrian may, and often does, step off the pavement unconsciously without taking thought of what may be behind him. There are strong rumours of newspaper campaigns and other steps to ensure the alteration of the present rule, all of which are steps in the right direction, and the change would be eminently desirable but for one thing, and that is the lawless pedestrian would not bestir himself to observe it.

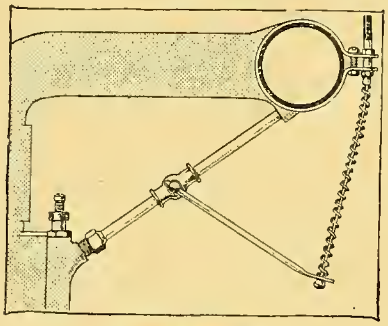
If, however, there were a prospect of the rule of the footpath being enforced the change would be undoubtedly beneficial, as people would be forced to glance at the traffic meeting them before making a crossing, so that they would run less risk and also make the lot of the driver of wheeled traffic a little easier. It simply means that the rule of the road and the rule of the footpath should be the same. In other words, one of them should be altered. Personally, we should say that it would be more desirable to alter the rule of the road, and so bring this country in line with the other nations; it would cost nothing, people would get used to the new rule very quickly, and it would certainly be no appreciable hardship to motorists, a very large proportion of whom, as soldiers, have become used to keeping to the right in France.

An index to the advertisements in this issue will be found on the page facing the back cover

IDEAS: Useful and Ingenious.

AN INDIAN IMPROVEMENT.

THE rough sketch shows an improvement that I have fitted to my Indian motor cycle, which is fairly simple to arrange. An ordinary small tap is soldered on to the pilot jet tube, and a piece of brass tubing sweated on to the handle of the tap to lengthen it. The end of the brass tube is flattened out and bent slightly, and a hole drilled just large enough to pass the end of the Bowden cable through, and this afterwards has a blob of solder on the end.



A petrol economiser.

A clip round the induction pipe provides means of adjustment, while a light spring returns the lever to its original position after it has been operated.

I find this effects a great saving in petrol, as most of the Indian pilot jets are inclined to be rather too large.

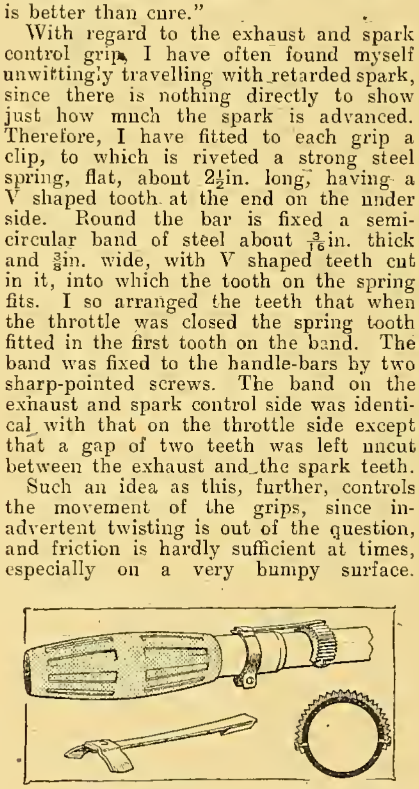
The ordinary single-lever Bowden handle-bar control is used to operate this pilot jet cut-off.—JOHN POTTER, Perth, Western Australia.

TWIST GRIP CONTROL INDICATOR.

ON reading Mr. L. Merlin's letter published in *The Motor Cycle* for February 14th I was tempted to forward the following idea which I have incorporated with the twist grip controls on my Harley-Davidson. I have no fault to find with the twist grip controls; on the contrary, my experience of them has shown me that they are excellent; but, unlike the lever type of control, one is unable to see by a glance when travelling just how much the throttle is open or the spark advanced. The chief difficulty I have experienced is starting up without causing my engine to roar, and it was to remedy this that I incorporated the following idea. I found there was a tendency to twist the carburetter control grip during the leg action of starting up, so that the engine sprang into life with a roar. This is no great detriment, but, unfortunately, my riding is mostly at night time, and in these times of air raids the unexpected roar of an engine in a silent street causes a great deal of commotion, not too pleasant to me, when peoples' nerves are "touchy." The sudden roar has also in the daylight a bad effect upon restless horses. I have caused two "runaways" by this means, happily without accident; but I have come to the conclusion that "Prevention is better than cure."

With regard to the exhaust and spark control grip, I have often found myself unwittingly travelling with retarded spark, since there is nothing directly to show just how much the spark is advanced. Therefore, I have fitted to each grip a clip, to which is riveted a strong steel spring, flat, about 2½in. long, having a V shaped tooth at the end on the under side. Round the bar is fixed a semi-circular band of steel about $\frac{3}{16}$in. thick and ⅜in. wide, with V shaped teeth cut in it, into which the tooth on the spring fits. I so arranged the teeth that when the throttle was closed the spring tooth fitted in the first tooth on the band. The band was fixed to the handle-bars by two sharp-pointed screws. The band on the exhaust and spark control side was identical with that on the throttle side except that a gap of two teeth was left uncut between the exhaust and the spark teeth.

Such an idea as this, further, controls the movement of the grips, since inadvertent twisting is out of the question, and friction is hardly sufficient at times, especially on a very bumpy surface.



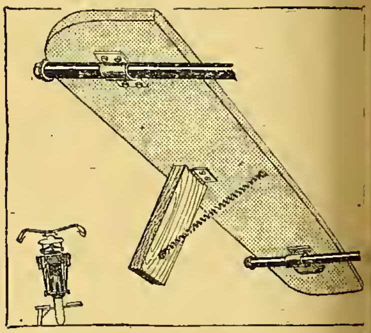
A useful refinement for twist grip control.

Individual bumps have no effect, but a series of bumps, my own experience tells me, causes movement of the grips. To some people this idea may appear needless and unnecessary; but I have found it very useful in traffic, and especially for changing gears silently without loss of power or stopping the engine. On a long trip, although the hands may be taken from the grips without fear of their moving, this idea incorporated makes any untoward movement absolutely impossible, and the grips may be themselves quite loose, but kept in position by the tooth on the steel spring.—H. W. TURL.

A PILOT STAND.

WHEN a motor cycle is used f short runs it becomes very tedio to jack it up on the stand aft each stop, especially since modern mediu and lightweights have reached and su passed the 2 cwt. mark. The followi description, therefore, of a subsidia stand that I recently fitted to 3 h.p. Enfield may be of interest readers.

The materials for this fitment consist a piece or hard boxwood, 6in. long by 2i thick by 1in. wide, a medium streng coil spring, a common door hinge, and few screws. One of the footboards, pr ferably the left-hand one, should be r moved from its carriers and an inclin groove 2.1in. × 1.1in. × .25in. deep cut the bottom of the board at the positi marked X. The hinge is then screw on to one end of the piece of wood a the whole fitted to the footboard in su a position that when open this leg will inclined outwards at a slightly obtuse ang and *not* at right angles. This is essent to the success of the fitment, as it pr vents any tendency for the weight of t machine to close the hinge. The c spring, connected up as shown in t sketch, completes the work, and the fo board may be replaced in position.

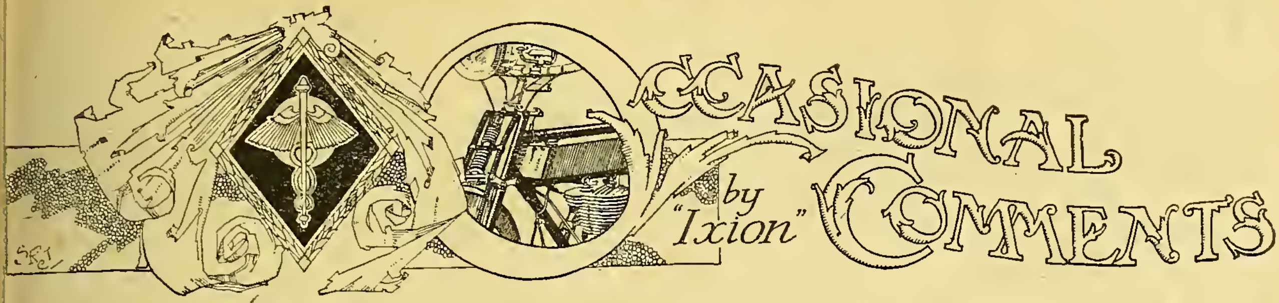


A Pilot stand, a time saving idea

This attachment was found to wo admirably, a slight kick being sufficie to knock it in or out of action, while wh it was in the open position it was fou practically impossible to overbalance t machine. In fact after fitting it t original stand was scarcely ever used.

In conclusion, it may be remarked th the application of this "tip" is not co fined solely to Enfields, for any machi fitted with wooden footboards may easily altered. ARMA

Readers of "The Motor Cycle" a invited to contribute to this page a ideas successfully adapted to their mo cycles. Contributions will be paid fo our usual rates. Rough sketches suffice.



OCCASIONAL COMMENTS

by "Ixion"

New Engines.

MR. PHILBROW owes me a gallon of No. 1, *vide* his letter in our issue of January 31st. So far from being one of his official engine disqualifiers, I am only a humble machine gunner, and had never even heard of him or his engine until he forwarded his complaint to us. I reiterate that his first letter was rubbish. The Government has financed two young engineers who are personal friends of my own, men without cash, influence, or reputation behind them: and they owe their success simply and solely to the merit of their designs—designs which have been approved in sterner tests than the M.M. can impose, seeing that they engage daily in aerial battles with the Hun. That Mr. Philbrow's engine was turned down by the same boards (presumably) does not necessarily prove that his engine is *na poo;* and, being absolutely ignorant of his engine, I was careful to say that he may conceivably have received less than his deserts. I merely refuted his absurd contention that the ideas of obscure inventors do not receive honest consideration and, if necessary, generous financial support. It is, therefore, the facts which prove Mr. Philbrow to be wrong, not I.

Petrol for Some.

I HAVE received various criticisms on my suggestion that grumbles about petrol permits were mainly based on apparent inconsistencies governing the issue. Two points are worth mention. One is that the issue of a universal pass is perhaps a blunder, and causes most of the indignation. A man receives a large grant of petrol on perfectly rational grounds, and, to save ceaseless official supervision, he is given a pass authorising every journey he makes by car or cycle within a given area. Human nature being what it is, he uses his motor for trumpery little trips of no national importance; another owner, who is debarred petrol for any purpose whatsoever, happens to know of this lazy self-indulgence on the part of a more fortunate neighbour, and is not unnaturally annoyed. For example, if you cannot get petrol to go and see your wife thirty miles away at week-ends, you become irate if a neighbour with a universal pass burbles home to lunch daily on a car rather than walk 800 yards. The second point is that personages of real importance must have all the petrol which can be spared for them. Here is a little exercise on the point. Take an A.B.C. railway guide and an engineering trade directory of London or the Midlands. Map out an imaginary day's calls in either of these districts for a man who is supplying steels to a number of firms or superintending the manufacture of ammunition in half a dozen different factories. Normal transport is so reduced and retarded that a full day's work of such a character is literally impossible without the aid of petrol. We cannot afford to keep our brainiest men sitting in trains or hanging round stations half their time: nor can we afford to hang up a gun, or an engine, or a plane for even half a day whilst the man who counts in its production is struggling across country to put some detail right.

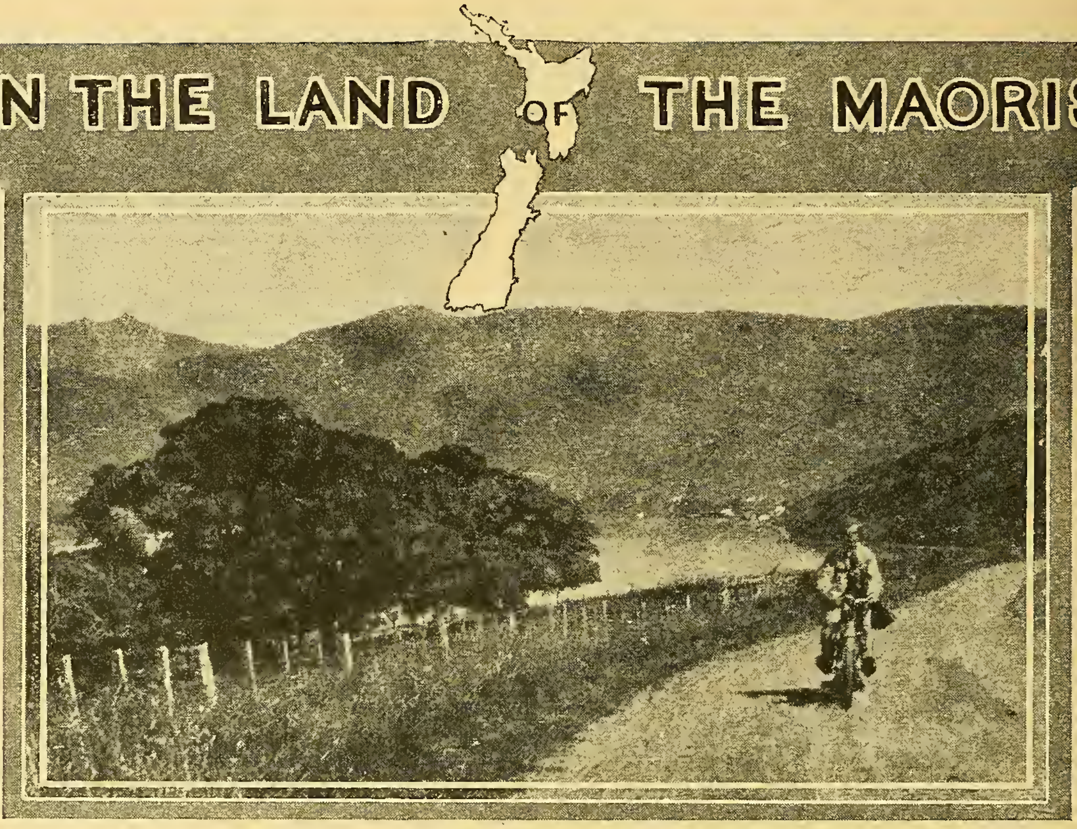
American Machines.

THE truth about American machines is rather difficult to ascertain. I have never been a big twin enthusiast, partly because I eschew sidecars, and partly because my mechanical conscience informs me that I can get the same speeds out of a crack $3\frac{1}{2}$ h.p. if I keep it properly tuned. But a few years ago various people whom I respected thoroughly rubbed the merits of the American into me, and at last I fell from grace and purchased a sample. I encountered immediate and interminable trouble. The twiddly bits strewed the road. The wheel bearings dissolved. The carburetter needle wore like a soft pencil, and after three months, or rather less, the London concessionnaire returned my cheque, and indignantly vowed that he would secure a gold medal in the Six Days with my discarded 'bus, though when it came to the point he did not even enter it. I swore off Americans for some time, until a leading rider and I fell to discussing the extreme discomfort of the average British machine of that date, with its rigid frame, harsh drive, and thumpy, one-lung engine. We agreed to try a pair of imported V twins. He got his first, and a month later paid a special call to release me from my share of the bargain; he stated that his 'bus ran like a dream, but that he was inventing a magnetic broom, which should trail behind his rear wheel and salve the small pieces which fell off.

Some Deductions.

ON the whole, I conclude that American manufacturers have quite recently begun to overhaul British makers in respect of *workmanship*, and that the time has arrived when one may try out one's peculiar ideals in respect of design with no fear of being appalled by badness of material or clumsiness of the construction. I have not hesitated to confess that the single-cylinder with a rigid transmission holds few charms for me, and when imports reopen I am going to buy a big 7-9 h.p. American and see how it suits me as compared with our flat twins. I believe the widespread prejudice against American 'buses is the penalty due to the soft stuff and crude detail work that disfigured the earlier exports, and that this prejudice is now wholly unjust. In other words, if you like a big V twin with a lot of frills on it you cannot beat American stuff, and it takes our own makers all they can do to equal it.

IN THE LAND OF THE MAORIS



At the western end of the Akaroa Harbour, Duvauchelles Road, N.Z.

As the crow flies the distance to the historic town of Akaroa is approximately twenty miles from the city of Christchurch, the capital of Canterbury, New Zealand. To get to it directly by road, however, the prospective tourist must cover fifty-two miles before the pretty little spot, nestling at the foot of the wooded heights of Mount Brazenose, is reached.

It is an ideal holiday resort, and as such is frequented by many business men at week ends and at annual vacations. Accommodation in pre-war days was excellent, and at the best hotels the tariff of 35s. per week could not be considered at all excessive.

The town itself has many of its streets and shops bearing French names, owing to a French colony settling here about the year 1850. The English, however, had forestalled them a few hours by planting the Union Jack on an eminence overlooking the present town, and thus the colony came under British rule. A monument erected where this incident happened commemorates this eventful page of New Zealand history.

Excellent catches of fish can be landed from the pier, or from one of the numerous boats—the deep waters of the harbour, which is about fifteen miles long and reputed to be one of the safest in the world, no doubt accounting for this.

Lyttelton Harbour at Governors' Bay. Blue gum trees in foreground

To reach Akaroa one leaves the city of Christchurch through the suburb of Addington, continuing on past Tai-Tapu, a dairying centre noted for its excellent butter and its notorious stretch of shingly road.

Winding along through Kaituna to Motukarara, the road skirts the foot slopes of the Port Hills on the left, with the extensive stretch of Lake Ellesmere on the opposite side literally alive with thousands of black native swans and pukakis (a species of water hen). This in the season is a sportsman's paradise.

Near here the rider passes through a wire netting gate across the road, part of a fence the full span of the peninsula, which is to prevent the ingress of rabbits at nightfall from becoming a plague on the land, as it is elsewhere in the Dominion. Failure to close the gate at dusk renders the rider liable to a heavy penalty.

Indolent Natives.

Turning now to the left past the lake, the way runs past Birdling's Flat

n the Land of the Maoris.—

or some six miles, until the Maori village of Little River is reached. The natives of New Zealand are ivilised, though rather indolent, and live in European ouses, depending on small plots of cultivated land for livelihood.

As far as this point the road has been comparatively evel, but a mile past the ative village it can be een winding its way up he valley to the 1,500 feet summit of the eights above.

The first few hundred yards of the ascent beyond the village prepares one for what is to follow, amely, a water splash, with a single - figure gradient immediately afterwards.

Steep Gradients.

From now on to the summit is five miles of second gear work, the rack abounding in steep gradients and blind corners.

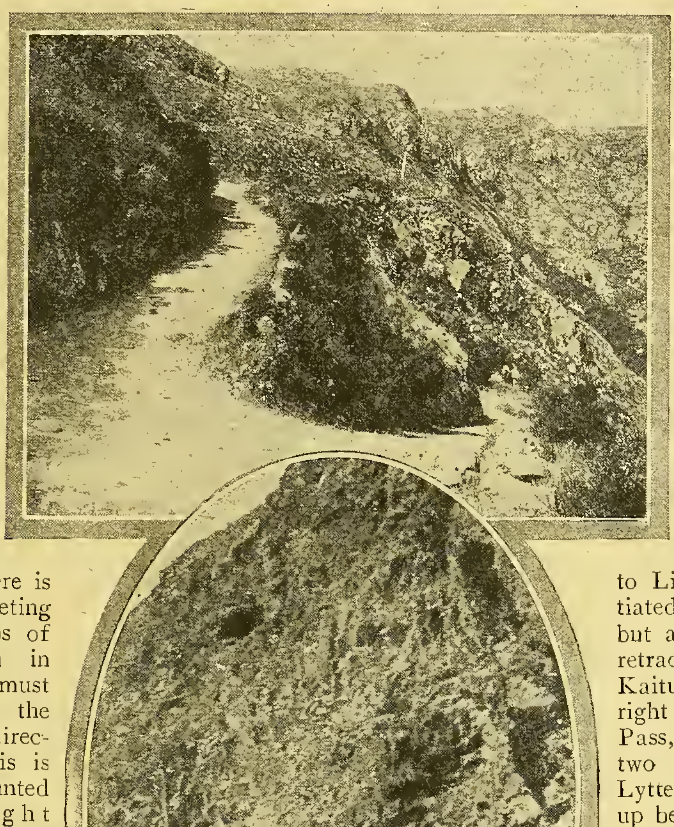
The rule of the road here is eversed, in that on meeting one of the numerous mobs of attle with a horseman in harge, all motor vehicles must ake the outside edge of the oad no matter in what direcion one is travelling; this is or the safety of the mounted man, as the animal might plunge over the precipitous hillside otherwise. Incidentally, owing to the dangerous character of this route, all the roads on the hills are closed to motor raffic after dusk.

The summit reached, the magnificent panorama of Akaroa Harbour stretches out before one with the peninsula of Onawe jutting out in the immediate foreground. In the early Maori wars last century 1,100 of the natives were massacred at this spot, whither they had fled from the surrounding Pas (a Pa is a native stronghold) for refuge.

Akaroa—our destination—can be seen from here across the waters of the harbour in the distance on the right, apparently about twelve miles away, but in reality twenty, the deception being due to the devious route over the intervening hills and bays.

A short distance down the hill brings one to the Hill-top Hotel, where a welcome halt for refreshments is the rule. Leaving the genial host, the next seven miles to the foot of the harbour at German Bay (let us hope the name has been changed now) require extreme caution and good brakes, as the hairpin corners are very severe.

The road now follows along the deviations of the beach through Duvauchelles and other numerous dairying districts, with more stiff climbs and descents, until after one very steep single figure rise and fall Akaroa is reached.



(Top) The Zigzag, near Lyttelton Harbour, a hill which will test the qualities of an engine.
(Bottom) Sumner Cliffs, seven miles from Christchurch.

The time spent here will pass pleasantly enough in boating and fishing, or as a change a delightful woodland stroll may be taken along some of the pretty paths in the vicinity.

As an alternative the return journey is best made *via* the long sharp ascent to the Summit Road, which follows the crest of the hills back to the junction near the Hill-top Hotel. The sea on each side of this track can be seen far below—rather a unique experience compensating for the climb.

The descent back again to Little River must be negotiated with extreme caution, but after leaving the river one retraces one's route as far as Kaituno, where a turn to the right will bring one to Gebbies Pass, a sharp rise of a mile or two to the western end of Lyttelton Harbour, which opens up before one with the Port of Lyttelton on the extreme left and numerous liners wending their way through the Heads in the distance.

Descending the pass, which has a nasty sandy stretch and S bend near the foot, the road winds amidst pretty wooded scenery until Governors' Bay is reached—a favourite picnic resort of Christchurch residents, being only eight miles away by the direct road.

The path which continues is cut out of the hillside and fairly level, alongside the harbour, until shortly after passing the Maori village of Ruapaki on the right, where baskets of native manufacture can be purchased, the Port of Lyttelton is sighted with its ever busy wharves of shipping.

The Zigzag.

The town traversed, the most critical test of the machine's capabilities is before one, the road steadily rising for 1,000ft. until the awe-inspiring gradient of the Zigzag looms above with its several hairpin corners and atrocious surface. Lucky is the rider

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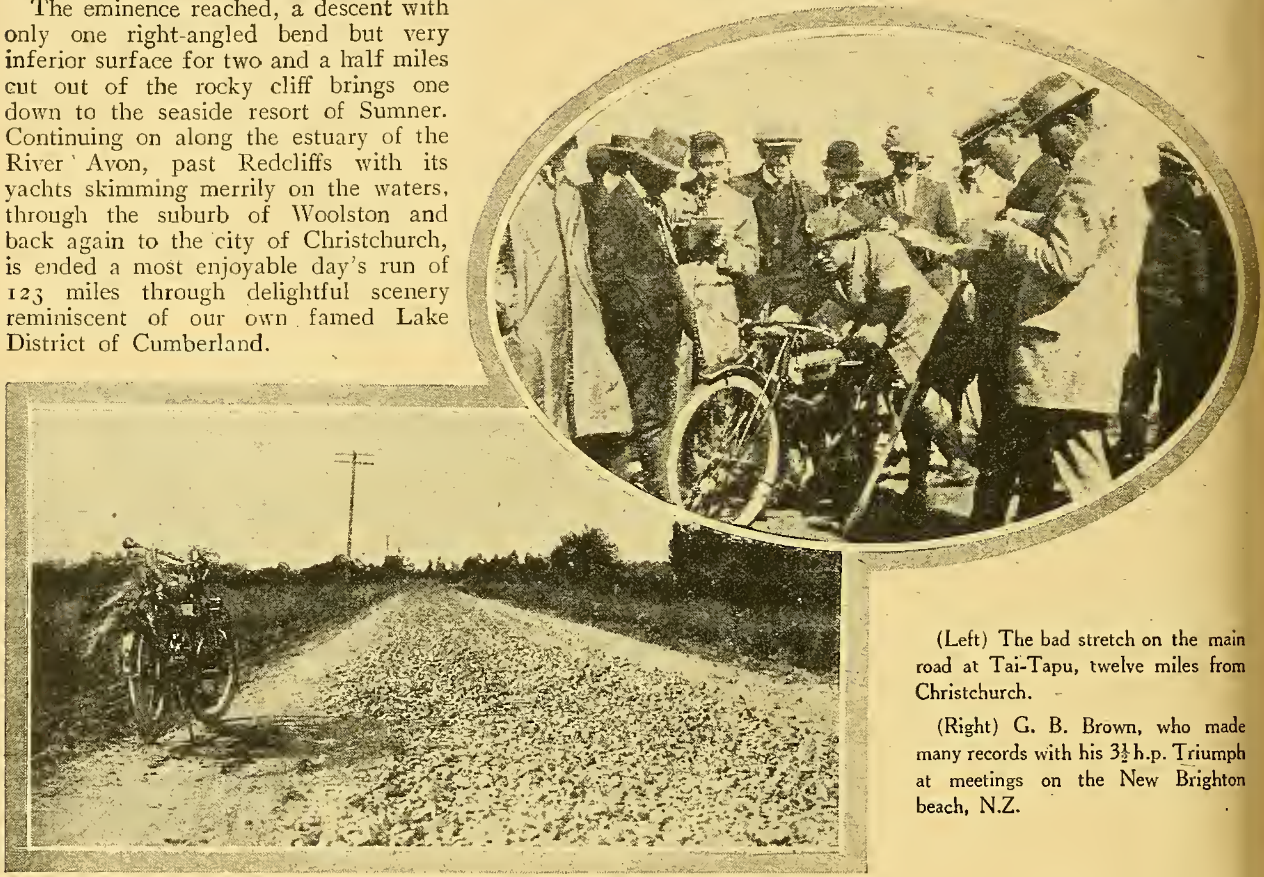
who negotiates this finishing touch to the trip at the first attempt—even then it will necessitate a very low gear, and skill on the driver's part.

The eminence reached, a descent with only one right-angled bend but very inferior surface for two and a half miles cut out of the rocky cliff brings one down to the seaside resort of Sumner. Continuing on along the estuary of the River Avon, past Redcliffs with its yachts skimming merrily on the waters, through the suburb of Woolston and back again to the city of Christchurch, is ended a most enjoyable day's run of 123 miles through delightful scenery reminiscent of our own famed Lake District of Cumberland.

Incidentally, this route is that used by the Christchurch Motor Cycle Club for their trials, the course being very severe, especially when the weather is at all inclement.

EBORACUM.



(Left) The bad stretch on the main road at Tai-Tapu, twelve miles from Christchurch.

(Right) G. B. Brown, who made many records with his 3½ h.p. Triumph at meetings on the New Brighton beach, N.Z.

THE A.C.U. AND THE L.C.C.

IT has been known for a long time that the local taxation authorities (in the case of London, the L.C.C.) have strongly objected to exempt motor cycles used for the delivery of goods and solely for business purposes from the licence. In the cases of two tradesmen who applied for the renewal of their petrol licences the authorities refused to recognise their motor cycles as trade vehicles, and refused to renew the petrol permits, claiming £20 4s. on petrol previously licensed to them. The Secretary of the A.C.U. took up the cases, with the result that the L.C.C. now recognise these machines as exempt from the local taxation licence, the claim for £20 4s. has been withdrawn, and the tradesmen have received fresh petrol licences. Previous to these cases being fought the L.C.C. stated that they would only recognise as trade vehicles those in which the sidecarrier frame was brazed to the frame of the motor cycle. The A.C.U. vigorously took up the matter, and pointed out that in no way could this be considered necessary, with the result that the L.C.C. inspector was satisfied that if a steel pin was driven through one of the nuts securing the sidecarrier to the motor cycle frame the vehicle would be considered to be exempt. The case is one of extreme importance, and will doubtless be read with interest by many of our readers.

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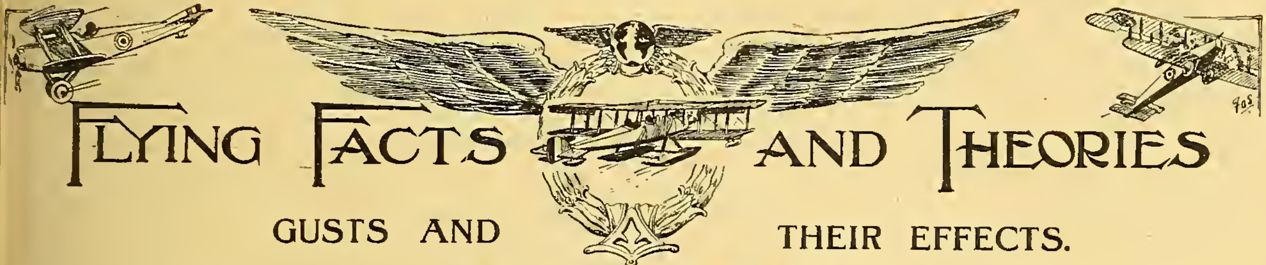
THE PETROIL LUBRICATION SYSTEM.

A NAVAL officer, in an interesting letter on the petroil system of oiling two-strokes, makes several comments worthy of note. He says the obvious and chief advantage is that it is fool-proof, while its disadvantages consist of either constant over-oiling, with the result that frequent removals of carbon are necessary, or under-oiling, and consequently overheating on hills. The best plan is to use enough oil with the petrol to run on the level and up slight hills without overheating, but this is insufficient for ascending hills with the throttle wide open. Before ascending a steep hill and after ascending it is a good plan to open the throttle fully for about a second, and at the same time switch off the magneto by means of a cut-out switch on the handle-bar. This brings a fresh charge of unburnt oil into the cylinder, and on the two-stroke engine he has used it has prevented overheating and excessive carbon deposit.



FLYING FACTS AND THEORIES

GUSTS AND THEIR EFFECTS.

By W. G. ASTON, A.M.I.A.E.

THERE is a popular supposition and fallacy that "gusts"—that is to say, changes in speed and changes in direction of the wind—are nearly always horizontal. This is no doubt traceable to the fact that near the ground they tend to be more or less so, since the presence of the earth is inclined to absorb their vertical component of motion. In the upper air, however, this influence is removed and gusts are found to favour no one particular direction rather than any other. In short, they come from every point of the compass in the horizontal plane, and in the vertical plane from every hour of the clock, regarding that instrument as a convenient direction post. So far as an aeroplane is concerned, gusts need only be considered in their capacity of changes of wind direction, as this in itself includes the idea of change of speed.

Effect of Cyclonic System of Circulation.

Suppose, for instance, that the wind has an earth speed of 30 m.p.h., and that an aeroplane is flying into that wind. If the speed of the wind momentarily drops to 10 m.p.h., it gives rise to conditions exactly analogous to those in which the aeroplane is supposed, whilst flying through perfectly calm air, to encounter a 20 m.p.h. gust moving in its own direction. For the purpose of considering the effect of gusts, therefore, it will be convenient to suppose that the aeroplane is flying in what is ordinarily still air, and is from time to time attacked by moving columns of air coming from various directions. It will be necessary, however, to remember that the gust which an aeroplane feels is a resultant between the earth-motion of that gust and the speed of the machine itself. Thus, supposing that, owing to heat radiation over some favourable spot, there is, on an otherwise calm day, a vertical, upward-rising column of air, a level-flying aeroplane which meets this column will receive, not a direct, but a diagonal, attack, as set out in the accompanying diagram (fig. 1). Whilst the gust is vertical relative to the earth, it is diagonal relative to the aeroplane. It is important to remember this point, as it might easily be supposed, if an aeroplane is flying in a volume of air which is bodily given a motion of translation upwards, that the aeroplane will undergo no change in the forces acting upon it—the whole system of air and aeroplane will simple rise, and consequently no disturbing effect will ensue. If the moving column of air is vertical relative to the aeroplane such is the case, but if it is diagonal relative to the machine a disturbing effect will take place. The conditions of fig. 1 are set forth rather differently (but with the same result) in fig. 2. The nett effect is that the flow of air, instead of being parallel to the longitudinal axis of the machine, is temporarily (whilst the upward gust lasts) at an angle to it; in other words, the angle of incidence of the whole machine is changed.

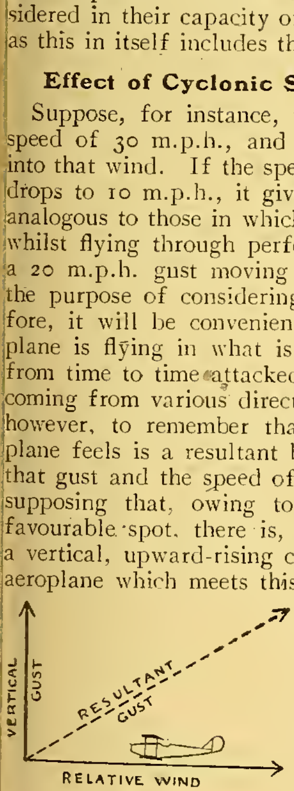


Fig. 1.

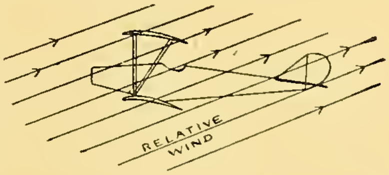


Fig. 2.

Acceleration caused by Gusts.

Since infinite acceleration is unthinkable, it is obvious that a gust cannot be considered to have a definite end or a definite beginning, for at each it must be gradually "smoothed off," as it were, to comply with the surrounding atmospheric conditions. That is to say, in no circumstances can the aeroplane feel the effect of a gust quite instantaneously, since the region of maximum speed in the gust will be immediately preceded by a region (which, however small, will still be there) of less speed. For all practical purposes, however, we can consider the gust to be finite, that is to say, we must allow that if it meets an aeroplane head on it cannot possibly strike both the main plane and the tail at exactly the same moment of time. On an average machine the tail will be at least 20ft. behind the main supporting surfaces, and if a head-on gust has a speed of 20 m.p.h. it is clear that it will take a little over two-thirds of a second to travel from one end of the machine to the other. On the other hand, a gust vertical relative to the machine will strike the whole of it simultaneously, whilst one that is diagonal will have a smaller time-difference than one that is purely horizontal.

In the case of the aeroplane meeting a diagonal gust, the first effect of the gust will accordingly be to tip the nose of the machine upwards, inasmuch as the main planes will get an enhanced lift before the tail is subject to the same influence. Meanwhile the immediate effect upon the aeroplane as a whole will be in the direction of immensely increasing its lift. The drag will also increase in accordance with the proportion of lift to drag, which is characteristic of the particular wing section employed. On the other hand, the air is of much less density than the aeroplane, and is consequently susceptible to much more rapid acceleration. If the gust springs up suddenly—as gusts do—the aeroplane will not immediately be able to decelerate sufficiently rapidly to permit of the rela-

Flying Facts and Theories.—

tive air speed remaining constant. Momentarily, therefore, this speed will be increased. The increased drag effect, consequently, will not immediately be felt, although, of course, it will duly slow the machine down to its normal, or original, air speed. Meantime, bearing in mind the already existing upward pitch, the aeroplane can be considered to be flying at a considerably increased speed and at a sensibly enhanced angle of incidence. The result is that it will climb very rapidly, just as if the pilot had suddenly opened up the engine and provided more propulsive thrust.

At the same time, if the machine has a reasonable degree of inherent fore and aft stability (as nearly all modern types have), it will, of its own accord, and directly the tail comes under the influence of the gust, endeavour to return to its normal attitude relative to the wind; that is to say, its longitudinal axis will tend to set itself parallel to the air flow, as shown in fig. 3. If the gust lasted indefinitely, that is to say, if the gust became a steady relative wind in the direction shown by the arrows in fig. 2, the machine would tend to fly level, *i.e.*, keeping its centre of gravity the same height from the ground (after its appropriate relative speed had automatically adjusted itself) in the attitude shown in fig. 3. Apparently it is "nose down," but only so in relation to the earth, not so in relation to the wind. After a moment or two, however, the gust will pass, hence the machine will once more be flying in still air, but at a greatly reduced angle of incidence. Furthermore, since its speed a moment previously was relative to the gust, its air speed will now also be reduced. The combined decrease of angle and of speed will cause the aeroplane to lose height, but the decrease in drag will at the same time allow it quickly to regain once more its appropriate air speed. Its inherent stability will, also, tend to bring it back to an even keel relative to the wind, as indicated in fig. 4. It is now in the same position as it was before it was attacked by the gust, but it has in the interim undergone three distinct changes.

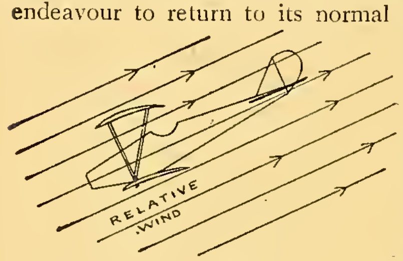


Fig. 3.

1. It has bodily risen owing to the difference between its own inertia and that of the wind, and later descended, for the same reason.
2. It has "pitched." Starting level it has first turned its nose up, and then down, owing to the stabilising action of the tail plane.
3. Instead of flying at a steady air speed, it has first accelerated, and then decelerated, *relative to the air*. Relative to the earth it has done exactly the reverse.

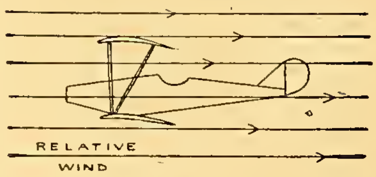


Fig. 4.

It has, it will be seen, been considerably disturbed, therefore, and the magnitude of its disturbance depends, of course, upon the speed of the attacking gust. It may be remarked, in passing, that the disposition of the principal weights along the longitudinal axis of the aeroplane provide a moment of inertia, or a flywheelage, about the transverse axis, which tends to sustain the pitching movement until the tail plane damps it out. It will easily be realised that such a movement, accompanied by a "shoot" upwards which is followed by a similar "shoot" downwards, is calculated to cause personal discomfort. Given sufficient control, however, the pilot can reduce this unpleasant motion very considerably. Hitherto we have been considering only the action which the machine takes of its own accord, but in the elevator the pilot has at his command a means of altering the angle of incidence or attitude of the whole machine according to circumstances.

Gust Disturbances.

When, accordingly, he feels the nose of the machine suddenly rise, as the main planes meet the gust, he will put its nose down by pushing the control stick forward; similarly, when the gust has passed, and he finds himself flying diagonally downwards, he will pull the nose of the machine up. He will thus increase the stabilising effect of the tail plane, and at the same time will not only reduce the angle through which the aeroplane would otherwise pitch, but he will also tend to shorten its pitching duration. Incidentally, he will tend to keep the air speed more nearly constant. It is unlikely that he will be able to keep it quite so, for which purpose he would need to be a very sensitive accelerometer, but he may pretty nearly do so. It is for this reason that most pilots prefer a thoroughly controllable machine for flying in "bumpy" weather. Such a machine readily answers the will of the pilot, and the effect of gusts can therefore be immediately checked, so that less discomfort is felt.

The difference between a stable and controlled machine in this connection may be compared to that between a lifeboat and a destroyer. The former goes over the waves and feels the effect of every one; the latter, if well piloted, rather goes *through* them. Such a comparison is, of course, by no means an analogy.

As I have before pointed out, we are entirely unaffected by velocities; it is only accelerations which disturb us, as one may well prove by going up and down in a fast passenger lift. Pitching provides such an acceleration, but it is less discomforting than the translational acceleration promoted by a quick rise or a quick fall, although, on an aeroplane, it is more immediately visible to the eye.

The change in the angle of incidence that can be caused by a gust results in a change of lift which may be very sharply felt indeed, and the word "bumpy" as applied to the air is by no means a misnomer on occasions. It must be a very severe gust that could force a machine downwards so quickly as to leave the pilot "behind," as it were, since in this case the downward acceleration of the aeroplane must be greater than that due to gravity. On the other hand, much smaller accelerations will give one this impression, which, as far as discomfort goes, amounts to the same thing.

Flying Facts and Theories.—

We will now consider other gusts that, whilst still being in the same vertical plane as the fore-and-aft axis of the aeroplane, can come from different directions. These may conveniently be denoted as resultants by an imaginary clock dial, in which the machine is the centre and supposed to be flying from right to left. The gust that has already been dealt with is, therefore, one coming from somewhere between six o'clock and nine o'clock.

At first sight it would appear that a dead-ahead gust coming from nine o'clock exactly would have no disturbing effect upon the machine other than causing it to rise vertically (in addition, of course, to its horizontal motion of flight). It is, however, in this position that the time-difference previously referred to will make itself most noticeable, and in such circumstances it is clear that the main planes will get the primary addition to lift, so that the nose of the machine will be tilted upwards, followed by a subsequent downward pitching motion. A gust coming from between nine and twelve o'clock will, on the contrary, by decreasing the relative angle of incidence of the main planes, cause them to lose lift, so that the machine will in this case turn its nose down, to be followed by an upward pitch (accelerated by the pilot's control) when the gust catches the tail plane. This case is, of course, the reverse of that which has been previously described, since the aeroplane will now tend to increase its air speed and dive, afterwards climbing and reducing its air speed. Any gust meeting the machine will necessarily tend first to increase its air speed, but its behaviour is dictated by the direction in which that gust comes.

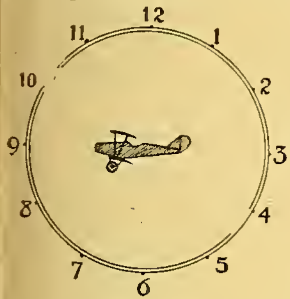


Fig. 5.

Similarly, a gust from between six o'clock and three will reduce air speed, and, as such a gust will tend to affect the tail first, the tendency will be for the machine to put its nose down, afterwards climbing again as the gust passes. One from between twelve o'clock and three will, *per contra,* cause the aeroplane to pitch upwards. It must be remembered, however, that the time-difference dependent upon the angle of the gust enters into the consideration.

The Conservation of Energy.

These motions are independent of this translational effect of the gusts. Those from three o'clock to nine, passing through six, will first lift the machine bodily up, but, when the gust is passed, it will drop again. Those from points on the other semi-circle will do the reverse.

For all practical purposes, whether a machine is suffered to regain its even keel by virtue of its own fore and aft stability, or is maintained in equilibrium by the exercise of the pilot's skill, the passage of a gust leaves it approximately *in statu quo ante.* If the first effect of the gust is to make it gain height, the secondary consequence is that it loses such height in regaining its normal air-speed. Conversely, if the gust causes it to dive, it will be able, when the gust has passed, to transform some of the kinetic energy thus so provided into potential energy, and so regain its previous altitude.

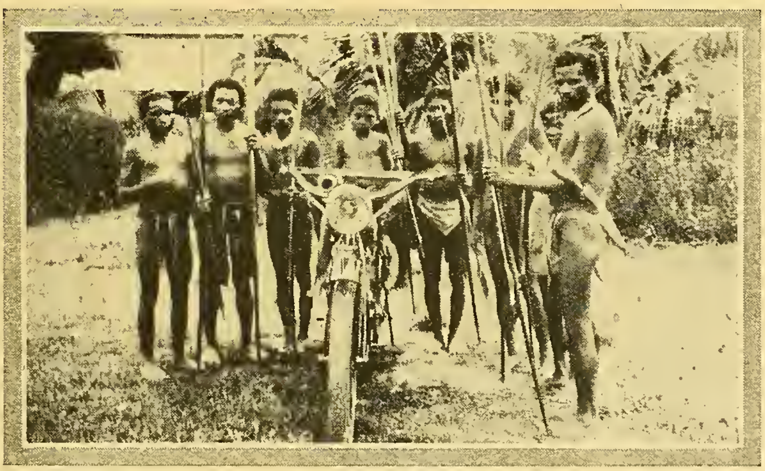
The effect of gust in a horizontal plane will be considered in the next article.

The Motor Cycle in the Philippines.

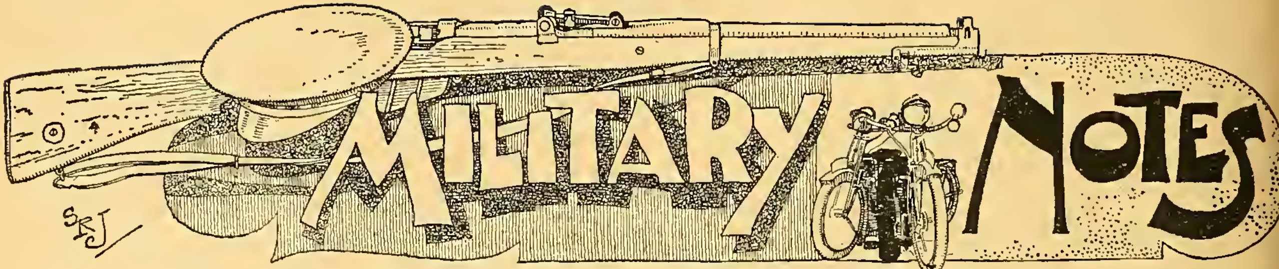
The Motor Cycle in yet Another Sphere previously Ignorant of its Existence.

THE motor has penetrated into the heart of Africa, and into the remotest parts of the globe, and soon the shyest native races will become accustomed to it. The photograph was taken in the Philippines by a lieutenant in the U.S. Service, who says his Indian never failed to create a sensation. Whenever he dismounted and went a short distance away the savages swarmed about the machine like bees on honey, handling the lamp and all the bright fixtures with wonder and fascination. They were somewhat afraid of the engine, as its throbbings shook the frame. One day no fewer than nine of these half savage men were fingering and inspecting the motor cycle, and made no objection—in fact, seemed rather proud—when the white man posed them for a picture.

When the time came for him to go on, the natives ran for a long distance trying to keep up with the machine, but as it gained in speed they stood still, straining their eyes to see it until it became very tiny in the distance, and finally disappeared as the road turned.



Some of that rare species, the almost real savage, inspecting a motor cycle for the first time.



£125 for a Triumph. Notes from Mesopotamia on Spring Forks.

HONOUR FOR SOUTH AFRICAN MOTOR CYCLIST.

We are informed that the late president of the Cape Peninsula M.C.C., Maj. Duncan MacMillan, has recently been awarded the Military Cross.

R.F.C. OFFICERS' CADET WING.

The Royal Flying Corps has recently formed an Officers' Cadet Wing. The age of admission is eighteen, but candidates may apply on attaining the age of seventeen years eight months. The pay is 1s. per day, and the cadet is provided with uniform, messing, and quarters. Application should be made by letter, stating full particulars regarding the applicant, to the Director of Air Organisation, Air Board Office, Strand, London, W.C.2.

£125 OFFER FOR A TRIUMPH.

Sgt. G. S. Cundell, writing from British East Africa, says: "I purchased a 4 h.p. countershaft Triumph from the local agents, Messrs. Childs and Joseph, in May, 1916. I have recently had all kinds of fancy bids for it, the latest being £125, and a practically new lightweight of well-known make thrown in. I have refused all offers, as I understand there will be a dearth of Triumphs in this country (British East Africa) until after the war in Europe. I rode the machine, carrying despatches, in the early stages of the East African campaign, through the jungle and over almost impossible tracks, and a better mount nobody could wish for."

NOTES FROM MESOPOTAMIA ON SPRING FORKS.

The following description of motor cycling in Mesopotamia comes from Cpl. Todd, a despatch rider with the Army Signal Co., and conveys a good idea of the difficulties encountered there. It will be noticed that the weakness of the springs in the forks is a point specially emphasised.

"Writing from this far-off Eastern country one often wonders whether a letter has much chance of being delivered safely; still, I will risk it. Your readers have all heard by now of the appalling conditions out here, and no doubt wonder how it is we manage to make good our duties. At present I am in a cushy billet in —— never mind, and the roads in the district are now in excellent condition; in fact, many stretches of desert are often like a billiard table, but others are just the opposite. The machine I am at present riding is an old Duggy, which has seen just on two years' service, and is still going strong. As there are very few stones about, the tyres last a remarkably long time, and cover a bigger mileage than is possible in England. Also the belts wear an abnormally long time, on account, I believe, of the even running of the engine. One thing the old Duggy requires for this country is a clutch. One often encounters fine quicksands, and all one can do is to drop into low gear, and go all out until it is stuck fast.

The Reliability of the Douglas.

"This machine is also wonderful in its reliability. It is seldom any of us are ever let down through mechanical troubles. But one thing I must mention, and that is the spring forks are not strong enough for the bad conditions here; I do not mean the forks themselves, but the springs. Many gadgets are fitted instead of the usual coil springs, such as leaf springs, etc. We at G.H.Q. all have now an extra spring fitted by our mechanics (who, by the way, deserve great praise for the way in which they have helped to keep these old machines in such excellent condition). It is fitted between the two existing ones, and is very successful in eliminating breakages. The 4 h.p. Triumph is a very fine machine for this 'place,' and gets through almost anywhere. Front fork springs are again a source of trouble, and cannot be easily remedied. Unfortunately, we at this depot cannot manage to secure any of these 3½ h.p. machines at present, but we are all very anxiously awaiting some of them."

500,000 AMERICANS.

Mr. Daniels, Secretary of the American Navy, has announced that there is now sufficient tonnage to land half a million men in France this spring.

A BRITISH ARMOURED CAR OFFICER ARRESTED IN RUSSIA.

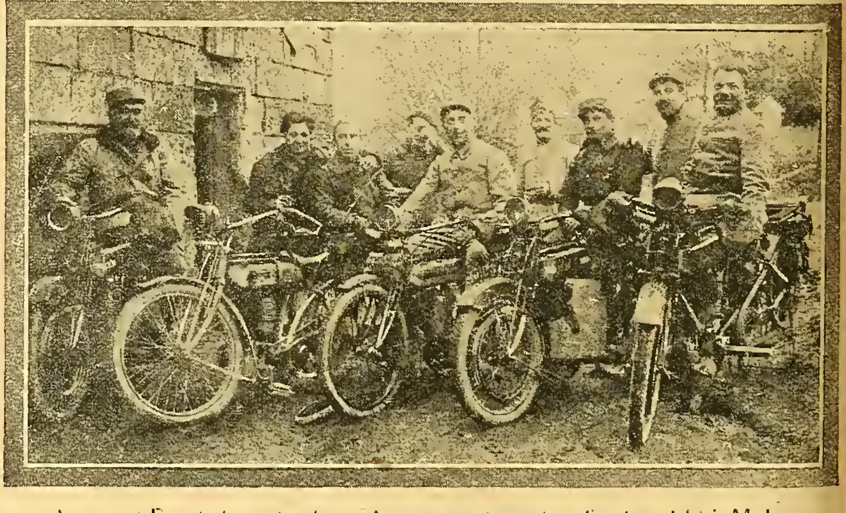
Commander Dye of the British Armoured Car Detachment, was arrested on February 2nd in Petrograd. He was charged with being the owner of two bombs, which, it appeared, had been overlooked while packing souvenirs of the fighting. After communicating with the Embassy, and receiving assurances, the police released him.

WRIT SARCASTIC.

"Tank Driver" writes: "In your issue of January 31st you publish a letter from Cpl. Richardson, M.T., A.S.C., in which he asks several questions, among these being, 'Who drive the Tanks?'

"As a member of the Tank Corps since its inception, and a Tank driver of sixteen months' standing, I wish to inform Cpl. Richardson that not a single Tank in France is driven by the M.T., A.S.C., whilst in action.

"I would like to ask Cpl. Richardson in return, 'Who move the heavy guns when it is too dangerous for the M.T., A.S.C. to do it?'"



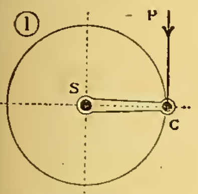
A group of French despatch riders. Among these (second reading from left) is Madame Gourand Moriss. She is one of the very few women D.R.'s serving with the French Army The mounts are Triumphs and B.S.A.'s.

THE MEANING OF TORQUE.

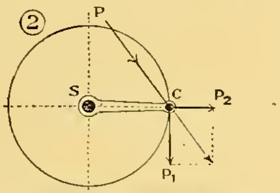
A Discussion and Explanation of a Widely Used but Often Misunderstood Term.

TORQUE means turning moment. Considering fig. 1, if we have a force P acting at right angles to crank CS, we subject the shaft S to a turning moment or torque of P × CS. Measuring P in pounds and CS (distance from centre of crank pin to centre of shaft) in inches, we have P × CS lb.-in. Sometimes it is convenient to state a torque as the equivalent force acting at a radius of 1ft.

Instead of P acting directly at right angles to the crank, we may have a state of affairs as fig. 2, in which case, in order to get the effective torque, it is necessary to resolve force P into its component parts CP_1 and CP_2, the former acting at right angles to the crank and producing the torque, whilst CP_2 represents the pressure on the crankshaft bearings in the direction shown.



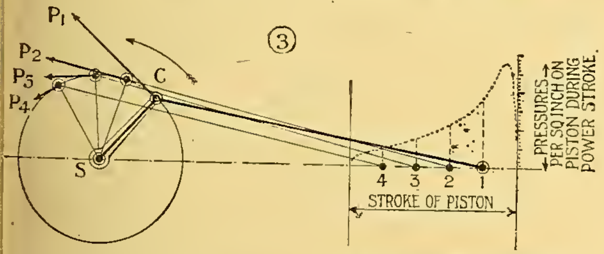
To illustrate the meaning of torque.



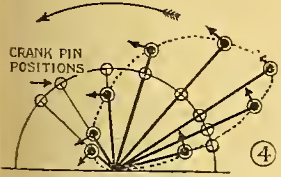
The effective torque in a reciprocating engine.

As regards the motor cycle, the question of torque interests us in two directions—(1) the torque developed at the engine shaft, and (2) the torque developed at the back wheel.

The character of (1) is quite definitely determined by the type of engine used in driving the motor cycle. In all cases (motor cycle) this torque is intermittent and variable, the degrees of continuity and variability of torque being modified according as there are one, two, three, or four cylinders to the engine. The greater the number of cylinders the better the torque, but four cylinders, even, is likely to remain for some time just outside the pale of normal motor cycle practice.

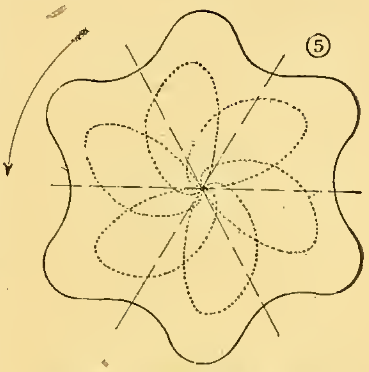


The development of the torque in a single-cylinder engine.



As regards (2), torque developed at the back wheel, this can be made the same within negligible limits for any of the above types of engines, it being the function of the flywheel to effect this result.

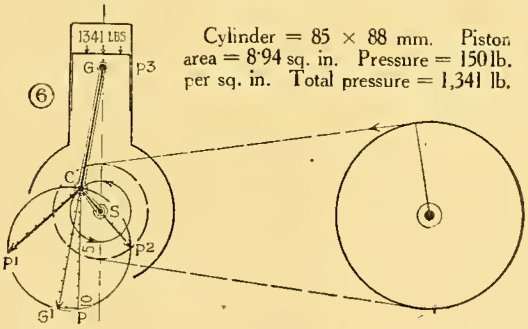
Given *the same effective torque at the back wheel* in both a single and a multi-cylinder machine, there is only one point where difference would be observable in riding the two machines—the single-cylinder machine would be inferior in accelerating power owing to the very heavy flywheel with which it would be fitted. In this regard it may be mentioned that some single-cylinder engines have a feeling of "life" and "power" which is quite misleading, and is the result of having under-weighted flywheels. In these cases even torque at the rear wheel is sacrificed to give rapid acceleration. Perhaps such a machine has advantages for short distance racing, but for touring work, where the hazards of greasy roads, etc., are to be encountered, a machine with an even torque at the rear wheel is to be preferred.



Showing the torque developed in a twelve-cylinder engine firing at even intervals, the torque produced by individual cylinders combining to give a resultant torque as shown approximately in the black line curve.

Torque in Single and Multi-cylinder Engines.

Figs. 3 and 4 show how torque is developed in a single-cylinder engine. There is, of course, only one power stroke every two revolutions of the engine, and during that power stroke the torque varies, being zero at the beginning of the stroke and rising to a maximum before the middle of the stroke, then falling away to zero again. Fig. 3 shows the variation in torque by assuming the crank to remain the same length, the arrow lines then showing how the force tending to turn the crank varies for different crank positions.



Cylinder = 85 × 88 mm. Piston area = 8·94 sq. in. Pressure = 150 lb. per sq. in. Total pressure = 1,341 lb.

CP = Total pressure on piston = 1,341 lb.
CG^1 = Compression connecting rod = 1,408 lb. = pressure on crank pin.
CP^1 = Force acting at right angles to crank = 1,110, giving a torque of 1,110 × $1\frac{11}{16}$ = 1,875 lb.-inches = 156 lb. at 1 foot radius.
CP^2 = Pressure on crankshaft bearing = 856 lb.
G^1P = Pressure of piston on cylinder wall at P^3 = 234 lb.

The Meaning of Torque.—

In fig. 4 it is assumed that the force tending to turn the crank is constant, whilst the crank assumes different lengths for the different torques developed. This method of showing the variation of torque is useful when multi-cylinder engines are under consideration. Fig. 5 gives an idea of the torque developed in a twelve-cylinder engine with even firing intervals. It will be seen that even in this instance the torque is variable.

Figs. 6 and 7 show a simple method of obtaining graphically the torque developed in a cylinder for any position of crank during power stroke, assuming that one has an indicator diagram or knows the pressure in the cylinder at the moment under consideration.

⑦

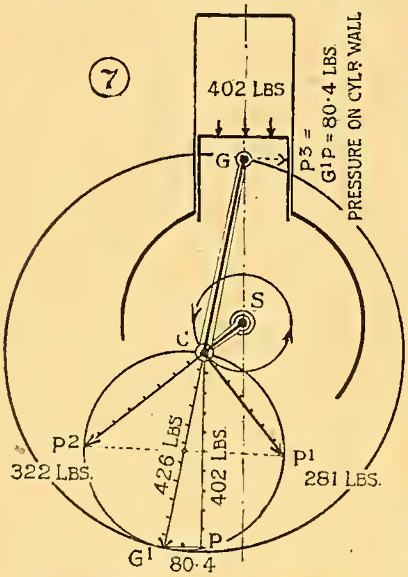


Diagram to show how the different forces may be ascertained.

The diagrams are practically self-explanatory, fig. 7 showing the construction.

It is necessary only to bear in mind that CP represents the total pressure in the cylinder, *i.e.*, pressure per sq. in. × area of piston in sq. in. After constructing diagram as shown, divide CP into ten parts. Each part will then have a value $\frac{\text{Total pressure}}{10}$. Divide out the lines CP_1 and CP_2 to the same scale as divisions CP, and the values of CP_1 and CP_2 can then be ascertained.

Average Torque.

In a motor cycle engine we have seen (1) that torque is developed only during one stroke in four, and (2) that this torque varies both with the pressure in the cylinder (or cylinders) and with the position of the crank.

If, however, we are told of a certain engine that it develops a torque of "28 lb. at 1ft. radius" when running at 3,000 r.p.m., we know that this refers to *average* torque. This may be defined as that torque which, constantly applied, would have the same effect as the intermittent and variable torque under consideration.

Average torque may be
- (*a*) Calculated from i.h.p.
- (*b*) Calculated from m.e.p. and engine capacity.
- (*c*) Calculated from b.h.p.
- (*d*) Obtained by direct reading from brake test.

The values of (*a*) and (*b*) would be identical, as also would be those of (*c*) and (*d*), but the two latter would have the less actual value, just as, and in the same proportion that, b.h.p. is less than i.h.p.

The relation between h.p. and torque is given by the following formula:

$$\text{Torque} = \frac{63,024 \text{ h.p.}}{\text{r.p.m.}}$$

where torque is in lb.-in.

In the case just mentioned, where torque is 28 lb. at radius of 1ft., we have

$$\text{Torque} = 28 \times 12 \text{ lb.-in.} = 336$$
$$\text{R.P.M.} = 3,000$$
$$\therefore 336 = \frac{63,024 \text{ h.p.}}{3,000}$$
$$\text{H.P.} = \frac{336 \times 3,000}{63,024} = 15\cdot9$$

The relation between m.e.p. and torque is given by

$$\text{Torque} = \frac{V \times \text{m.e.p.}}{4\pi}$$

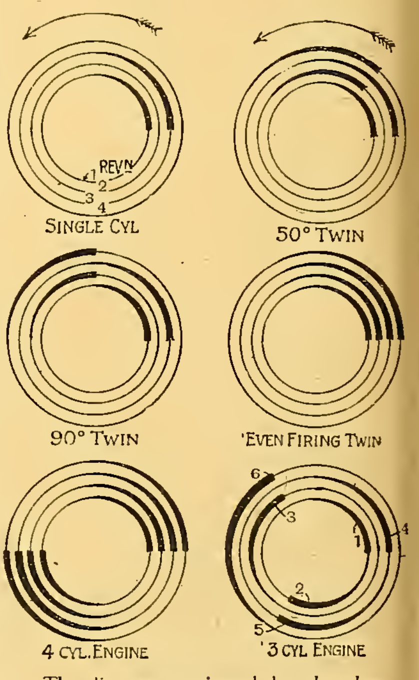
where V = engine capacity in cubic inches.

Example.—Engine capacity 60.3 cubic inches, m.e.p. = 75.

$$\text{Torque} = \frac{60\cdot3 \times 75}{4\pi} = 360 \text{ lb.-in. } (4\pi = 12\cdot56)$$
$$= 30 \text{ lb. at radius of 1ft.}$$

If the mechanical efficiency or $\frac{\text{b.h.p.}}{\text{i.h.p.}} \times 100 = 85\%$, then the effective average torque would be $\frac{85}{100} \times 30 =$ 25.5 lb. at 1ft. radius.

The remaining diagrams show the variation in the intervals between the power strokes of different multi-cylinder engines, and give an idea as to the intermittent nature of the torque developed at the engine shaft.



The diagrams are intended to show how the intervals between the power strokes vary in one, two, three, and four-cylinder engines. The circles represent successive revolutions, and the thickened line shows the power impulse in any revolution.

Notes on curves published with description of the Harley-Davidson 1918 model, "The Motor Cycle," Jan. 3rd, 1918.

An indicated h.p. curve was calculated from m.e.p. curve, but found to be identical with that

The Meaning of Torque.—

marked b.h.p., showing an error in either curve or description.

Judging that the torque curve would have been obtained by actual brake test, I made a calculation of h.p. from the torque curve to get at the true b.h.p. values. The new curve was found, however, to show greater values than the i.h.p. curve at certain points, though considerably less at others.

An explanation should be given with such curves as these if they are to be intelligible. In the case of b.h.p. it should be stated whether the gears are in operation or not.

The following particulars would perhaps be most suitable for the ordinary motor cyclist:

Maximum i.h.p. at various speeds.
Maximum b.h.p. at engine shaft.
Maximum b.h.p. at back wheel with first gear in.
Maximum b.h.p. at back wheel with second gear in.
Maximum b.h.p. at back wheel with third gear in.
Torque and m.e.p. could be calculated if wanted.

ENGRO.

The Norton Programme after the War.

DURING a recent visit to the works of the Norton Motors, Ltd., at Aston, Birmingham, we were informed by Mr. Norton that they have decided to adhere to the single-cylinder policy, and to confine their efforts to three models in solo mounts, in place of the former six or more different varieties.

(1.) The T.T. Sports model, 3½ h.p., belt drive, with variable pulley, for the speed merchant.

(2.) The Utility mount with a 3½ h.p. T.T. engine of special tune, all chain drive and three-speed countershaft gear, for the average rider.

(3.) The Utility mount with a "big four" engine and all chain drive, three-speed countershaft gear, for very heavy solo or sidecar work.

The last two models will carry the well-tried Sturmey-Archer three-speed gear as hitherto.

Thus this firm of long-stroke specialists will cater for all classes of riders without staging a mixed lot of models.

It is interesting to find that Mr. Norton has been carrying out experiments with aluminium alloy pistons for some time past. He has given a fair trial to a number of different alloys, and, so far, only one brand has withstood the test; others invariably ran tight at speeds over 25 m.p.h. and knocked loose at the gudgeon pin holes. The one successful alloy piston has stood up well, and gives promise of wearing as well as the ordinary type of piston. Whether this will form a feature of the three "after the war" models, already mentioned, is not yet decided; no doubt it will be left to the purchaser's choice.

A recent publication of the firm is a small handbook of driving hints; it contains concise instructions and advice, together with specifications of the Empire or military model Norton, and is well worth perusing by anyone interested in single-cylinders. Messrs. Norton will be pleased to forward copies on receipt of stamp (1d.) to cover postage.

The National Motor Cyclists' Fuel Union.

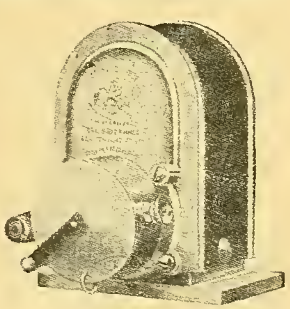
WE recently had a conversation with Mr. A. W. Torkington, chairman of the National Motor Cyclists' Fuel Union, who, in view of the fact that some misapprehension exists in the minds of the general public as to the objects for which the N.M.C.F.U. was formed, has asked us to make the matter quite clear to our readers.

Letters have appeared in various journals which make it evident that the writers believe the Union is endeavouring to extort concessions from the Petrol Control Department which are denied to other people. The Union has even been credited with the desire to use force if necessary. Members of the N.M.C.F.U. have joined themselves together in a body in order that they may have their individual cases properly put before the Government. Owing to difficult housing conditions many munition workers have to make awkward cross-country journeys in order to get to their work at six o'clock in the morning, and they are entitled, in such circumstances, under the Petrol Restriction Order, to an allowance of petrol for their motor cycles. They are not asking, and have not asked, for a collective grant of petrol; that point has been clearly laid down in the interview which their chairman had with the Petrol Controller, Sir Evan D. Jones, his deputy, Mr. Webb, and the other Departments concerned, who have treated the Union with both consideration and sympathy.

This is the best answer to all the criticisms which have been levelled against it, because had the Union commenced its career by demanding such privileges for its members it would not have received either consideration or sympathy from the Petrol Control or other Departments.

To judge from some of the letters the chairman has received, it would appear that the writers consider that the munition worker should be treated worse than other people, and that he had no right to petrol at all.

Members who are entitled to petrol under the Motor Spirit and Gas (Consolidation) Order, and who apply to the secretary, Mr. W. Ellis, 70, Abingdon Street, Derby, will now get it, but they must be careful to give all the necessary details, as otherwise the Controller cannot grant a licence. In a few days full particulars of the position and recommendation forms will be in the hands of all the secretaries of the Union.



The latest model "Lion" magneto manufactured by the Britannic Electrical Co., Ltd., Birmingham.

CURRENT CHAT

Times to Light Lamps.

GREENWICH TIME.

Feb. 28th	6.5 p.m.
Mar. 2nd	6.8 ,,
,, 4th	6.12 ,,
,, 6th	6.16 ,,

Summer Time.

The clocks are to be put one hour forward this year on the 24th of next month, and they will be put back again on September 29th. This gives us five weeks longer of that inestimable blessing, more daylight, than we had last year.

Motor Cycling in South Africa.

Motor cycling in South Africa appears to be suffering but little from the war, if the membership of the leading club is anything to go by. The C.P.M.C.C. has recently received several additions to its membership lists, and the sport as a whole seems to be in a flourishing condition.

Joy Rides for Wounded Soldiers.

This is another of those things, of which we have here seen the last, that still carries on at the Cape without any restraint. Meetings and rides are frequently held, and the men appear to appreciate the action of those motorists who take them out as much as they used to in England.

Sidecar Combination v. Train.

On a recent occasion the rider of a 1917 Powerplus Indian, with a sidecar loaded to its capacity with camping outfit, raced the No. 19 Union Pacific passenger train from Cheyenne, Wyoming, to Granite Canyon, a distance of twenty miles up hill. Although the train was drawn by two powerful engines the Indian motor cycle outfit won by ten minutes. The race was followed with interest by the passengers on the train, who cheered the driver heartily when he pulled up at the crossing at Granite Canyon.

Employment of Discharged Soldiers and Sailors.

The employment of discharged soldiers and sailors, both now and after the war, is a matter that has already received much discussion, and has formed an excuse for the creation of many and various committees. Although there is in existence a committee specially for the purpose of dealing with those men connected with the motor industry before the war, this is a matter that is also dealt with by the Institution of Automobile Engineers, which is now hoping to be able to prove of considerable assistance to various Government Departments in this sphere as need arises.

Imports and Exports.

The value of the imports of motor cycle parts in January amounted to £3,138.

EXPORTS.

The exports still maintain a comparatively high level, though lower than December's figures.

	1916	1917	1918
Number of machines	836	872	514
Value of motor cycles parts, tyres, accessories	£70,065	£79,130	£52,998

Famine in Motor Cycle Spokes.

A South London motor cycle agent informed a correspondent that he spent a whole morning last week making a round of the London factors in quest of spokes for motor cycle wheel building. One well-known house had not even a dozen in stock! Another only stocked the heavier gauge, for light car wire wheels, and no factor had any stock of or near the gauge required. Finally, he obtained a few dozen from a retail depot.

Special Features.

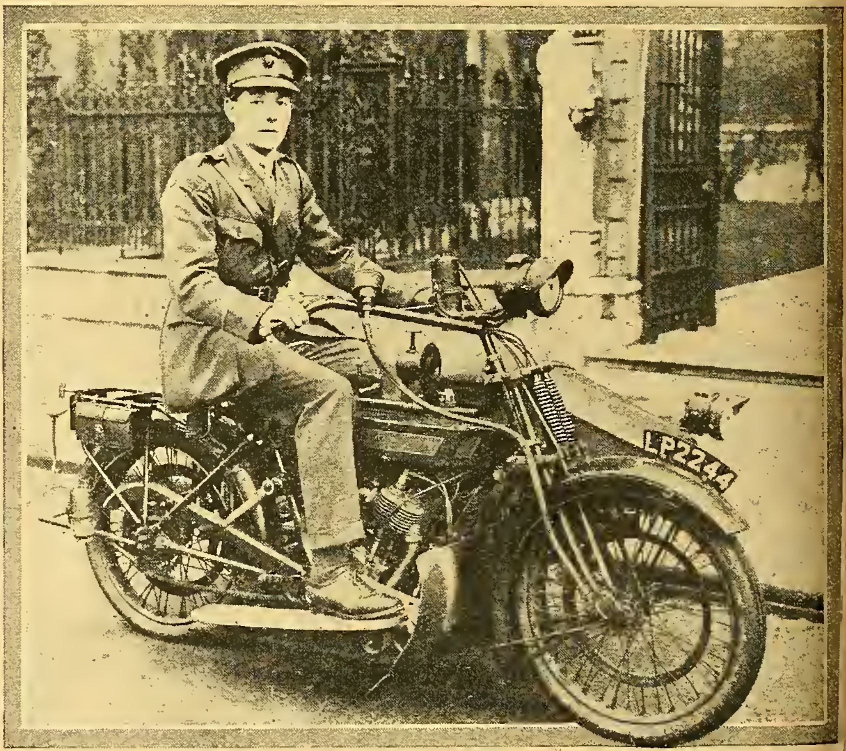
THE MEANING OF TORQUE.
IN THE LAND OF THE MAORIS.
OVERSEAS NOTES.

National War Funds.

The National Relief Fund (distributed £3,783,657)	£6,331,757	0	0
British Red Cross	9.138,973	2	7
Tobacco Fund	148,804	0	0

The Institution of Automobile Engineers Graduates' Prize.

This prize has this year been awarded to Mr. C. Pole Wedmore for his paper on "Valve Timing," and a second prize has been awarded to Mr. H. L. Towns for a paper on "Welding." These prizes are awarded annually to the graduates reading the best papers during the previous season.



A. J. Davies, late lieutenant London Irish Rifles, who lost his leg above the knee through wounds received in action at Vimy Ridge. He purchased the Enfield 6 h.p. combination last September, and found no difficulty whatever in learning to drive, although it was his first experience with a motor cycle. He uses the machine daily on Government work, and, owing to the gear being hand-controlled and the hand-starting, he finds the machine extremely easy to handle even in the most congested traffic.

A Passenger Attachment.

A police witness at Willesden recently tated, "The defendant was driving a motor cycle and sidecar, with a young ady attached."

The Local Taxation Licence Rebate.

The Auto Cycle Union, in its endeavour to help the individual motor cyclist, has been in communication with the Treasury concerning the question of obtaining a rebate on the local taxation licence paid by such motor cyclists as have been debarred from using their motor cycles on and after November 1st, 1917, owing to he Motor Spirit Restriction Order. The ecretary requests us to insert the reply:

> "Sir,—I have laid before the Lords Commissioners of His Majesty's Treasury your letter of the 6th inst. enquiring as to the return of a proportionate part of the motor car licence duty to those persons who, having paid such duty for the year 1917, were debarred from using their motor cars or motor cycles on and after 1st November, 1917, by the operation of the Motor Spirit Restriction Order, No. 2, 1917.
>
> "In reply, I am to state that their lordships have no power to accede to this suggestion.
>
> "I am, Sir, your obedient servant,
> "(Signed) J. L. HEATH."

On the other hand, an owner of a motor cycle is not liable to pay motor car licence duty for the current year unless he is actually using his machine, and if he is using it exclusively for the purpose of any hospital or ambulance work, or any work undertaken by agreement with the Government in connection with any Naval or Military purposes, he is entitled under Section 14 (2) of the Finance Act, 1916, to claim repayment of the whole or a proportionate part of the duty.

The secretary of the Auto Cycle Union will be pleased to advise owners how to prepare such claims.

Mr. W. Williamson Convalescent.

All friends of Mr. W. Williamson, of the Williamson Motor Co., Coventry, will regret to hear that he has been seriously ill with pneumonia and pleurisy. He was unconscious for eleven days and nights, but was able to get up last week, and is now well on the way to convalescence.

Advisory Committee of Business Men.

An Advisory Committee of Business Men to the new Department of Overseas Trade is in process of formation, and will be announced shortly. The temporary headquarters of the Department will be at 73, Basinghall Street, E.C.2, to which personal letters for Sir Arthur Steel-Maitland should be addressed.

The Coming Season.

The longer days and the improving weather will naturally make those of us who cannot use our motor cycles yearn for peace and plenty (of petrol); but this year we must grin and bear it, stick it out, and put up with a hundred and one inconveniences, discomforts, and privations, which are as nothing to those our brave soldiers Overseas have to endure. It is only by so doing that we can emerge victorious over the Hun.

After-the-war Models.

Most firms have attractive post-war propositions either actually on the road or designed and ready to be manufactured as soon as possible after hostilities cease. Only the other day we came across a brilliant young engineer who has had much experience with motor cycle engines. He is at present in the M.T., and is engaged in hauling about heavy artillery, and is kept busy in maintaining caterpillar tractors. Nevertheless, he has had time to design a complete motor bicycle fitted with an even firing V twin two-stroke engine, possessing many novel and original features, and a new and ingenious ignition apparatus. Both will shortly be described in *The Motor Cycle.*

The Institution of Automobile Engineers.

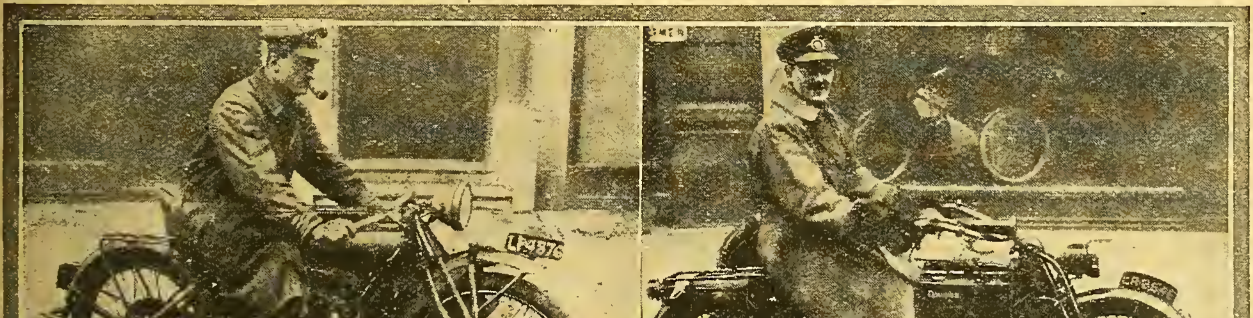
At the last meeting of this body, held on the 13th inst., Mr. Ernest A. Savage, the Librarian of the City of Coventry Public Library, read a paper on the "Utilisation of the Data of the Automobile Industry through Bureaux of Information." The paper was very well received, and is of special interest at the present time in connection with the recently announced proposal of the formation of research associations.

American Sympathy.

At the meeting the following telegram was read from the Society of Automotive Engineers (of America): "Expressing great admiration for your effective and magnificent work in the war, the members of the Society of Automotive Engineers assembled in annual meeting to-day send cordial greetings and felicitations. In the common cause for democracy we send assurance of co-operation to the fullest extent.—CLARKSON."

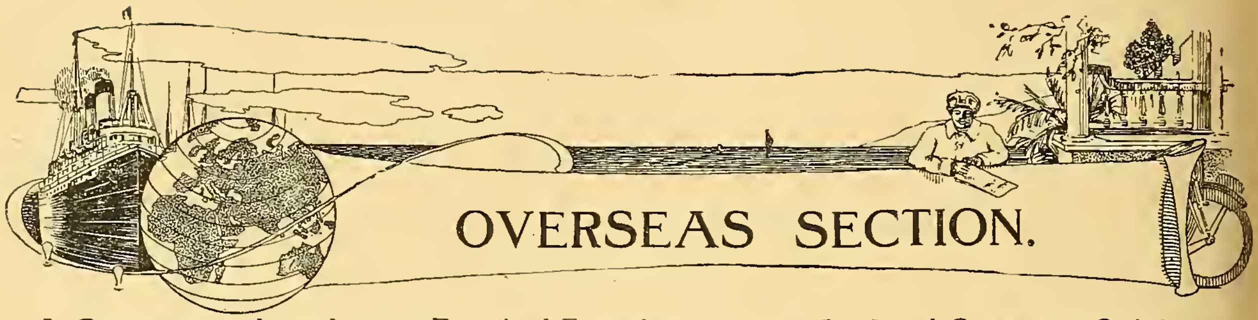
Women's Legion and Lady Motor Cyclists.

We have received a letter from Lady Londonderry, President of the Women's Legion, from which we have pleasure in quoting: "A cutting from *The Motor Cycle* has been sent me, in which there is a letter from Miss Violet Moore, stating that she could obtain neither information nor work regarding the Women's Legion drivers. May I point out for the information of future correspondents that the headquarters of the Women's Legion Motor Drivers' Section are at 15, Pall Mall East, where all information can be obtained from the Commandant, Miss Ellis. The Legion is responsible for providing all the drivers for the A.S.C. and R.F.C. for home service. Miss Moore applied to 115, Victoria Street, and she was referred to Miss Ellis. I find, on enquiry, that no communication has been received from her at that office. This section is a military branch and directly under the control of the War Office."



MEMBERS OF THE A.C.U. MOTOR MESSENGER DETACHMENT.

(Right) G. L. Fletcher, manager of the London depôt of Messrs. Douglas Brothers, Ltd. He was a well-known competition rider from the very earliest days of the manufacture of Douglas motor bicycles. (Left) Vivian Olsson, an old member of the Motor Cycling Club, who has competed in numerous important A.C.U. and M.C.C. competitions. He joined the R.N.A.S. in 1914, and was attached to the Armoured Car Squadron under Commander Sampson, R.N., in France, where he did excellent work, serving with the squadron some eighteen months. Both these men are now doing excellent work with the newly instituted Auto Cycle Union Motor Messenger Detachment.



OVERSEAS SECTION.

A Commentary based upon Practical Experience and a Study of Overseas Opinions.

The Overseas Lightweight. MANY Overseas riders possess an erroneous and somewhat narrow conception of lightweight machines, as is illustrated by their constant reference to "buzz-boxes" and such like designations, but, in spite of this prejudice, it is obvious to anyone that the lightweight is a highly commercial proposition, possessing no inherent defect which limits its sphere of adaptability to the conditions of a settled country. It must be admitted, however, that most makers of small two-stroke machines have not hitherto paid much attention to Overseas demands. The idea generally has been to capture the low price market, and, because machines of this type particularly lend themselves to cheap production, cheapness and the lightweight have progressed, more or less, hand in hand.

A machine cannot be made cheaply to stand up to the requirements of the Overseas riders, and, if the lightweight is to succeed Overseas, its makers must aim at larger markets, which will enable them to sell a stronger article at existing prices. By cheapness we refer not so much to the price of the machine as to the quality of the minor fittings. The general practice has been to fit a good engine and gear box, and proceed forthwith to take it out of the purchaser by utilising pedal-cycle fittings. We have undertaken journalistic tests of numerous two-strokes excellent in every respect, except for the flimsiness of such fitments as mudguards, saddles, handle-bars, and controls. These appear to have been stuck on as an afterthought, and are of hopelessly inferior workmanship compared with that of the power unit throughout, whereas—particularly for Overseas use—the quality of the minor fittings largely determines the satisfaction the machine will ultimately give.

This point cannot be rammed home too firmly. The Overseas rider expects a good power unit, and will get it any way, so that the quality of the minor fittings will weigh very heavily in his judgment. He is not going to purchase a lightweight if by so doing he is assured of mudguards which will shortly rattle to bits, controls which will break or swivel round the bars, handle-bars which assume the semblance of the "extreme touring" variety, owing to his having hauled the machine forcibly out of a mud hole. and hubs that will give trouble after the first rainy season. We do not mean to imply for one moment that such defects characterise the present day two-stroke, but we do say that they have characterised many of the cheaper variety which have found their way to Overseas markets, and that this state of affairs has not a little to do with the prejudice existing towards lightweights in many parts of the world.

Details that Count. IT is, of course, impossible to eliminate the cheap machine, and the rider who buys a mount of unknown make simply because the price tempts him naturally takes his own risks. But, on the other hand, there are numbers of lightweights made that belong to a higher order, and yet which fall sadly short of Overseas requirements simply on account of the makers having "spoilt the ship for a ha'porth of tar," as it were. We have a good engine, good gear box, good frame, good spring forks, but the whole effect is spoilt by the fitting of mudguards of the wrong design—mudguards with flimsy points of attachment, and permitting insufficient wheel clearance, so that even a light fall of snow renders the machine unrideable. Similarly an inferior saddle is perhaps fitted, with the result that vibration and pot-holes form the essence of one's first riding impressions. Fit the same machine with a good saddle and one could hardly believe it to be the same machine, for of all types of mount the lightweight demands a saddle of superior quality, without which even the best of material throughout the remainder of the machine will fail to impress the rider favourably.

* * *

As a Recruiting Agency. GIVEN a lightweight built in every respect in accordance with Overseas requirements, there is no doubt that it would meet with an immense reception in all quarters of the globe. It would not, of course, take the place of the heavyweight, as it would meet the requirements of a different order and be patronised by a different class of rider. We do not for one moment approve of the common statement that lightweights are suitable only for city use in our Overseas dominions. Given a lightweight of the proper type, the demand for it would be almost universal. Sold at a little over half the price of the heavyweight and of proved reliability, it would be a medium whereby scores of new recruits would be initiated into the pastime, to buy heavier mounts later on, perhaps, but who would not have contemplated taking up the pastime at all had it not been for the light machine.

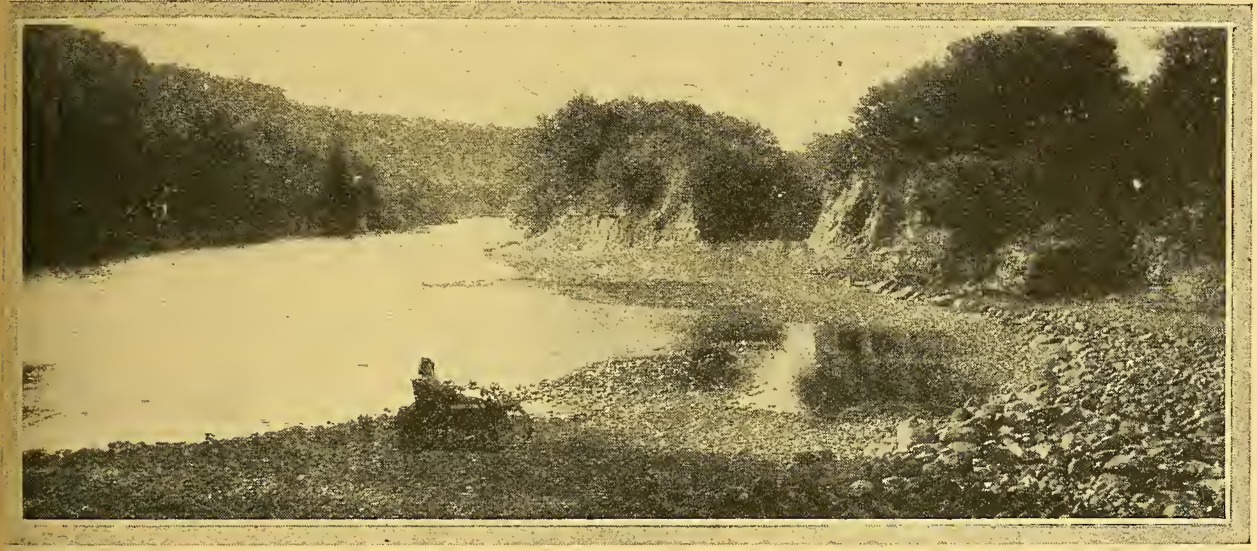
Nor would the lightweight be scorned by the old hand: for making journeys from one plantation to another, for twenty-mile trips to and from the settlement, even for serious riding when the conditions are such as to render the handling of a heavy mount laborious. We ourselves have ridden lightweights under the most trying conditions, and are convinced that, with the addition of a simple three-speed gear, heavy flywheel, and hand-controlled clutch, the type is suitable for almost any conditions. It will stand pro-

verseas Comments —

nged low gear work as well as—generally better than -a more powerful engine, and, though naturally slow, ne is not as a rule out for speed when the conditions re so perverse as to tax the staying powers of the igine.

By the above we do not suggest that the small mount ould even hold its own in side-by-side riding with the eavier variety; we know that the latter is preferable, ut we are equally convinced that there is ample room or both.

The question remains, then, whether any reputable rm of lightweight manufacturers is prepared, after e war, to make a special bid for the Overseas market. n England the demand for the simple two-speed ghtweight will probably hold good, and in this country the conditions do not entirely demand those features essential for Overseas use. The third gear would be superfluous, the extra heavy flywheel unnecessary, the hand clutch, similarly, could be dispensed with for the sake of simplicity, so that, though a special model for Overseas use in the way of heavyweights may not be necessary, it undoubtedly is necessary in the case of the lightweight. In the heavyweight the Overseas rider requires what we require at home, but he requires it more urgently; in the lightweight he wants everything we want and a little more ere the type can be regarded as a practical proposition. It remains, then, for some maker of note to tackle the problem of the Overseas lightweight in all earnestness, and there is no doubt that, given proper administration at the other end, he will reap a rich reward.



The Addo Drift—a typical specimen of the drifts in South Africa, which in time of flood are roaring torrents.

A Selection of Letters from Readers scattered all over the World.

Overseas Machines, a Sporting Challenge, and German Goods.

From "ARTIFICER," Siege Artillery, France: "The arrival f the January 3rd 'Blue 'Un,' with its particularly varied ontents, has put the finishing touch to a resolve made onths ago, to write a note of appreciation regarding your ournal.

"In commencing, I may as well state my identity as an)verseas man—an Australian to wit—serving with one of he heavy batteries on the Western Front: one who has aken particular interest in articles appearing from time to ime in *The Motor Cycle* which dealt with Overseas requirements, conditions, and markets, also the lack of representaion of British motor manufacturers in Australia, the latter esulting, as you are well aware, in the seizure of the Colonial market by American trade.

"At present American motor products, such as Indian, Harley-Davidson, and Reading-Standard in the motor cycle ine, and Ford, Studebaker, Overland, Dodge, and Buick, re now rife at home, and bid fair to continue even *après a guerre*, unless British manufacturers awake.

"Apart from the big difference in initial outlay of a nachine, and the quick, cheap replacement of spares, the nethod of doing business that the Yank adopts to impress upon you that a Ford or an Indian will save time and trouble, and bring you in more pounds sterling per day, scores every time.

"However, time will show, and I hope that after the war we shall see U.K. on Colonial roads in as large numbers as U.S.A.; but to effect this, design, price, and business methods must be revised, and standardisation in each class adopted.

"So far as motor cycles are concerned, the W.D. Triumph at present used out here nearly fills the bill for an all-round solo mount, the only objection being front forks and brakes. Abolish the front rim brake and fit an additional one on the back wheel—internal expanding for preference—to act in an emergency, the extra weight being worth it; scrap the forks and fit Mark II. Druids or else Mark I., with Terry links, a wider guard in rear, and at £65-£70 it will sell like hot cakes.

"While talking of Triumphs, I would say a word or two in connection with a 'sporting challenge,' in which a 4 h.p. Triumph, chain-driven and otherwise as per W.D. pattern, and an 8 h.p. Jap-Excelsior were matched recently. The challenge was sporting enough, but the action of the Excelsior man in appearing with a Montgomery sidecar against the other's heavy Gloria, which the Triumph firm have fitted for years, and scooping up the laurels for himself, seemed scarcely as sporty.

"To have qualified for the title of 'sport,' he should have uncoupled and effected an exchange of sidecars, if they were interchangeable or could readily be made so—at least he could have offered—and I fancy if the Excelsior had had to lug along the coachbuilt sidecar there would have been a different tale to tell afterwards.

"As it was, the 4 h.p. with its heavy load making the performance it did, proved itself more than a match for the 8 h.p. twin and featherweight sidecar, taking into consideration the difference in c.c. and load.

Overseas Comments.—

"Sidecar machines to suit the Colonial conditions and requirements should be somewhat after the military model New Imperial, with a decent twin engine of about 750-1,000 c.c., 28in.×3in. interchangeable wheels all round, a reliable three-speed box, dual clutch control, and three brakes on rear wheels of the internal expanding and external contracting type; internal expanding on rear wheel and car wheel to act simultaneously from pedal on right side, and a Bowden-operated external contracting brake controlled from the handle-bar to act as an emergency brake on the driving wheel. Incorporated electrical equipment optional, and either sprung frame or efficient seat-pillar (spring), and a strong kick-starter.

"Just at present there is a slight argument in your columns anent the German goods question. May I assure the Ives, Little, R.O.W. coterie *and* others that they may be thankful they are not in the Army—for soldiers they can never be—and that the Army is very thankful, too? Their sort are not worth wasting bad words over. F. Jones's letter provided me with a quarter of an hour's merriment; he should join a literary society before rushing into print, and then take first packet off to Liepzig or Mannheim, where a stray English bomb would bring him to his senses.

"*Re* the 'four-cylinder spoil-the-sport' theory, no, never! Ride a Henderson or a F.N. four and you have got the poetry of motion; but a one-lunger is the best for a healthy T.T. or to shake off a bad liver.

"Discussions such as this, 'Centrifugal Force,' 'Flying Facts and Theories,' technical articles, and 'Ideas,' all go to make the journal a big 'two-pennorth.'

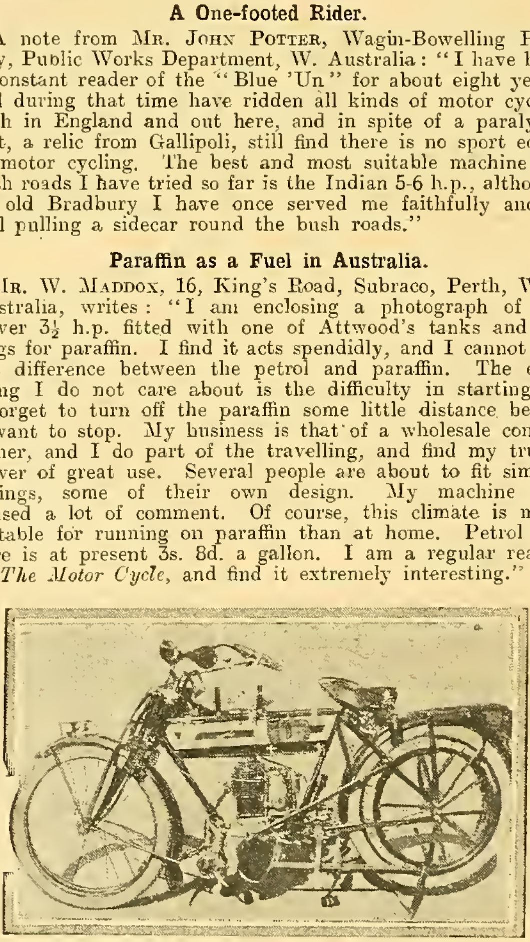
"In conclusion, may I express appreciation of the general lines on which your paper is run—its tone, its originality and fairness?"

A One-footed Rider.

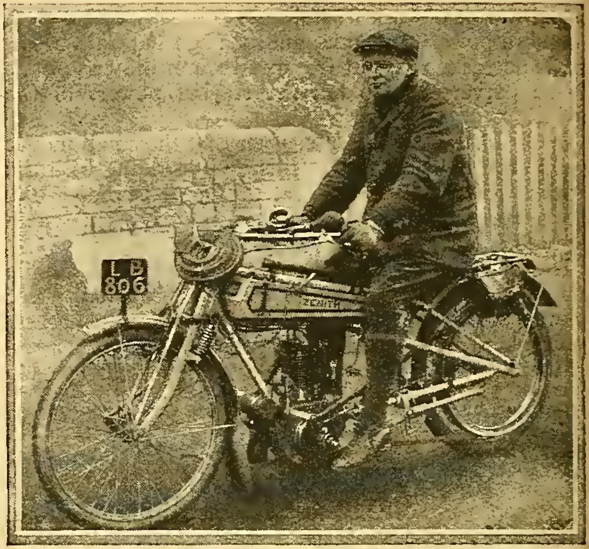
A note from Mr. John Potter, Wagin-Bowelling Railway, Public Works Department, W. Australia: "I have been a constant reader of the "Blue 'Un" for about eight years, and during that time have ridden all kinds of motor cycles, both in England and out here, and in spite of a paralysed foot, a relic from Gallipoli, still find there is no sport equal to motor cycling. The best and most suitable machine for bush roads I have tried so far is the Indian 5-6 h.p., although an old Bradbury I have once served me faithfully and is still pulling a sidecar round the bush roads."

Paraffin as a Fuel in Australia.

Mr. W. Maddox, 16, King's Road, Subraco, Perth, West Australia, writes: "I am enclosing a photograph of my Rover 3½ h.p. fitted with one of Attwood's tanks and fittings for paraffin. I find it acts spendidly, and I cannot tell the difference between the petrol and paraffin. The only thing I do not care about is the difficulty in starting, if I forget to turn off the paraffin some little distance before I want to stop. My business is that of a wholesale confectioner, and I do part of the travelling, and find my trusty Rover of great use. Several people are about to fit similar fittings, some of their own design. My machine has caused a lot of comment. Of course, this climate is more suitable for running on paraffin than at home. Petrol out here is at present 3s. 8d. a gallon. I am a regular reader of *The Motor Cycle*, and find it extremely interesting."



A Rover running on paraffin in West Australia.



A SLOPING TANK OF 1909.

Many motor cyclists are under the wrong impression that the sloping tanks, such as are fitted to the A.J.S. and Allon and other modern machines, are quite new in design. The photograph, taken in 1909, shows a Zenith which had a tank giving the desirable low riding position.

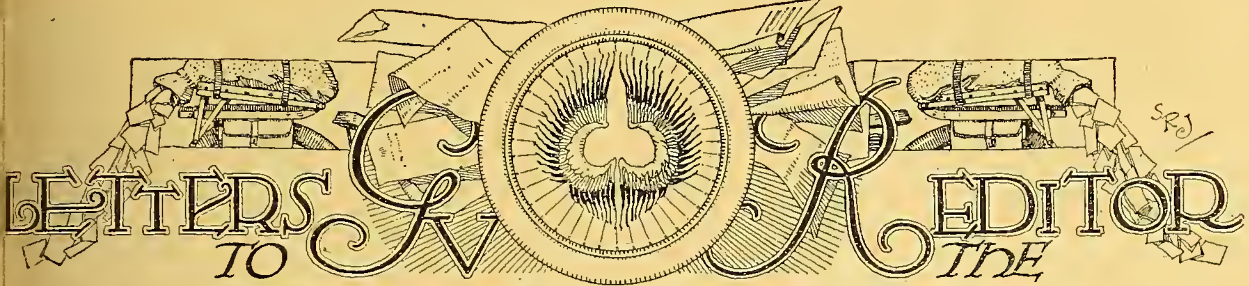
Remarks on Singles and Belt Drive in Canada.

Mr. Wm. Greenwood, Toronto, Canada, sends the following interesting letter: "I am very much interested in *The Motor Cycle*, as it keeps one up to date with the improvements that are from time to time bringing machines as near perfection as any 'mechanics' can make them. I have been in the cycle business since 1874, when I was agent for Messrs. Dixon Bros., blacksmiths, Hulme Hall Lane, Miles Platting, Manchester. To look back to that date—and having ridden practically more or less every machine, not missing the Unicycle (an American product), where the rider sat inside the wheel—I was acquainted with Dan Rudge before he invented the ball bearing [Ball bearings were invented long before Rudge's time.—Ed.], having met him at Mr. Clarke's, maker of the Cogent bicycles, in Wolverhampton. I have sold over 200 motor cycles in Toronto, 130 of which were Triumphs. When the war commenced of course we could not get any supplies, and this fact put us out of business.

"The English manufacturers cannot understand why they cannot do business in Canada. There are several factors against them—*e.g.*, their prices; the inability to get parts in case of breakage; and, in some cases, the Canadians look with disgust on the single-cylinder machine, which falls short when put to serious usage on our 6in. deep sand roads; also the vibration is more pronounced than in the twin.

"Another big factor against motor cycles here (and this does not operate in England) is that almost everybody has enough land behind his dwelling on which he can store a small or large car easily, and a car can be bought here now for a less price than we can sell a 4 h.p. Triumph, fully equipped with sidecar, etc. It is all right for a man and his wife, but when additions arise, then they cannot be left at home, and the motor cycle and sidecar makes a poor substitute. I am convinced the future will furnish a small family car, and its advantages over the sidecar are obvious, especially in bad weather. We have now ten or twelve inches of snow to pull through, with the thermometer at 14° to 20° below zero. There are hundreds of cars pulling through it, but I have seen only one motor cycle and sidecar, and that was a four-cylinder Henderson.

"Sometimes I take my Triumph Junior out, but when I get into snow a few inches deep I have to walk, and this I can do with the engine running and the belt slipping. I should advise the English manufacturers to keep their eye on the four-cylinder Henderson, as it is certainly a wonderfully reliable machine, and its freedom from vibation is remarkable."



LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address

RONT BRAKE DESIGN.

Sir,—We notice in your issue of the 14th inst. an article n front brake design. Our machine is mentioned, amongst thers, but we should like to point out that we were the irst to design and adopt the type of brake referred to; nd as proof of this we may mention that our motor cycles itted with this brake were exhibited at the 1912 show. The lesign met with a considerable amount of adverse criticism t the time, but was followed by other firms at a later date.

LEA AND FRANCIS, LTD.,
R. H. LEA, Managing Director.

LAMINATED SPRING SYSTEM FOR THE REAR WHEEL.

Sir,—With reference to the spring frame designed by Pte. A. F. Markham, and described in your issue of February th, if Pte. Markham has patented this arrangement since November 23rd, 1916, it would appear to be an infringement f our patent of that date, No. 109,887.

In view of the fact that you suggest existing machines night be modified, we think it would be advisable to intimate o your readers that we should consider the application of he design to existing machines as an infringement of the bove-mentioned patent.

F. E. BAKER, LTD.
FRANK E. BAKER, Director.

ARRYING AN ACCUMULATOR.

Sir,—"Ixion" was complaining two or three weeks ago hat he could not find any place on an ordinary solo machine vhich was steady enough to carry an accumulator. May I oint out to him and the rest of your readers that a spring rame is not necessary? I described my device in a letter o you last autumn, and I trust it will become popular. There is no patent about it. It continues to give me complete satisfaction, and it will do the same for any man or voman who has decent saddle springs, and will keep an ppreciable amount of weight on the saddle all the time. The accumulator is carried in a box that is hung by rod from one of the back corners of the saddle, sliding up nd down on a guide rod fixed to the frame and steadied by radius rod, anchored near the top of the engine.

W. REGINALD WILSON, M.A., M.B., B.C. Cantab.

ADDLE CLEARANCE.

Sir,—I take the liberty of using your journal to express my opinion of British motor cycle frames with regard to saddle clearance.

Prior to the war I owned several motor cycles, and almost all were British and of the best make. British saddles are very comfortable, but I regret to say that British motor cycle manufacturers do not allow the riders of their machines the full benefit of that comfort, because the saddle comes into contact with the back mudguard when riding over bad roads, just where comfort would be most appreciated. This is due to inadequate clearance between saddle and rear guard or carrier on some makes.

This inconvenience does not exist in American machines, for the top tube of the frame is dropped differently from the British, thus affording a full movement of the saddle. I recognise that some British manufacturers have this point under consideration; but many have omitted to probe the matter, or perhaps have preferred to sink the saddle to make the saddle line level with that of the top tube of the frame

H. FROCOURD.
Illiers

THE POSITION OF THE CLUTCH.

Sir,—It was with considerable surprise that I read on page 150 of your February 14th issue a statement by your contributor "Chinook" that it was better for the clutch to run at half engine speed than full engine speed, especially as this was prefaced by remarks on weight saving.

Will "Chinook" give us his reasons for such an assertion, as a reference to elementary mechanics shows that in order to obtain the lightest possible clutch it must be placed at the point of highest speed and least torque, namely, the engine-shaft? In this position the friction moment is at a minimum, and consequently the spring pressure and clutch parts can be lighter than anywhere else in the transmission line. Also the reduction of spinning weight has a beneficial effect on gear changing—a fact well known to car people, but mostly overlooked by motor cyclists.

Another feature is that, if the clutch is incorporated with an outside flywheel, the revolving portions form part of the total weight of the flywheel, with a consequent saving in the overall weight of the machine. Also, what noticeable effect can the position of the clutch have on the distribution of weight, as "Chinook" considers? A modern 4 h.p. touring machine weighs about 250 lb. Engine, clutch, and gear box account for about 100 lb. of this total, and as a decent clutch should weigh less than the magneto, its location cannot have anything but a negligible effect on the position of the centre of gravity of the machine.

May I refer those who require proof of the foregoing remarks to the February issue of your sister journal, *The Automobile Engineer*, where, on pp. 54-9, they will find an article explaining the first principles of clutch design?

E. CAUDWELL, A.M.I.A.E.

PETROL FOR THE MUNITIONEER.

Sir,—I am sure that I have not yet seen in *The Motor Cycle* any "narrow-minded laments" as regards the petrol restrictions.

Probably J. Carroll, Lt., B.E.F., does not know that motor cycling is practically a dead letter, while private cars owned by "someone" still run about by the score. I know of many cases, and will relate one.

A large manufacturing firm before the war could not afford to invest in even a motor cycle, but since has a large private car weighing a matter of 34 cwt. Now this car runs empty from W. to W.—a matter of eight miles—every morning to bring back one man; takes him back at night and returns empty—a matter of sixteen miles per day. Moreover, the train service is quite handy. I questioned a police inspector as to this, and he told me that the police did not want to stop everybody, and, besides, the user of the car was a manager.

I have no sympathy with anyone who laments over joy-riding being stopped, but why one class and not another? One thing I, in common with other motor cyclists, would like to know is, Is shortage of petrol so serious as J. Carroll, Lt., and others say?

I may say I have a petrol licence, but how is it that I can, if I wish, get petrol without a licence? We over here know full well that there is a war on. If there is any need to stop pleasure motoring—well, do so by all means; but why when no need?

I hope Lt. Carroll will not take this letter as a criticism of his good self, but as an honest question whether there is a petrol shortage and a serious one.

Widnes. PRIMUM-MOBILE.

[There *is* a shortage, and it is serious.—ED.]

AMERICAN AND BRITISH MOTOR CYCLES.

Sir,—"Moveo," in his article in defence of the American, is obviously writing from an experience of the two or three most refined Americans over here. I took "Chinook's" original article to refer to American practice in general, and when one examines the samples of the lesser lights amongst the Americans over here, and notes their glowing crudities, it is obvious that he is pretty well right.

"Moveo" refers to a "Big Four" which requires the gudgeon pin to be driven out before the cylinder can be removed. I understand that the phrase "Big Four" was originated by Mr. Norton, and applied by him to his 82×120 mm. engine. One begins to doubt the extent of "Moveo's" engineering experience if he were unable to remove a Big Four Norton cylinder without first removing the gudgeon pin. I am using a 1917 model Big Four Colonial model at present, and I think I could present "Moveo" with the entire machine, in small pieces in a box, inside the time that he could dismantle the engine alone of one or two Americans I know.

Many of my motor cycling friends are members of the medical profession. It may interest "Moveo" to know that several of them, after a spell of riding Americans, have reverted to British machines. Their reasons for the reversion are singularly unanimous.

1. Unreliability after the first workshop tune has worn off.
2. Rapid wear of essentials after six months' to a year's hard work.
3. Constant attention to a multitude of flimsy gadgets, which, despite the alleged better balance of the American engine, persist in shaking loose, curious to relate!

These three main reasons are quite enough for the man whose machine receives the minimum of attention and the maximum of work.

M.B.

Ystalyfera.

ANOTHER LIGHTING PROBLEM.

Sir,—I had similar requirements to Mr. R. Percy, and solved them simply and satisfactorily. I wanted a no-trouble lighting set for my two-stroke on my daily journey of six miles each way through dark, steep, and narrow lanes.

I had a wooden case made to attach to the sloping top tube of my machine, and in this I put my accumulator, size 4 volts 20 amps., price 12s. 6d. (1915), bought at an electrical gadgets shop in Bull Street, Birmingham—just a plain standard line. The head lamp was an F.R.S., with an adjustable focus, and a readily removable lamp socket which enables one conveniently to throw a light where required when mending punctures, etc., at night. The tail lamp was a smart little thing, beehive shape, obtained from Brown Bros., and carried a 4 volt bulb obtainable at any flashlight-monger's. The head lamp I adapted to take a similar bulb by making a device from an old bayonet cap socket to receive the screw bulb type of contact. (My description of this was published in *The Motor Cycle* some two years ago.)

In this way I obtained a lighting set with the following good points:

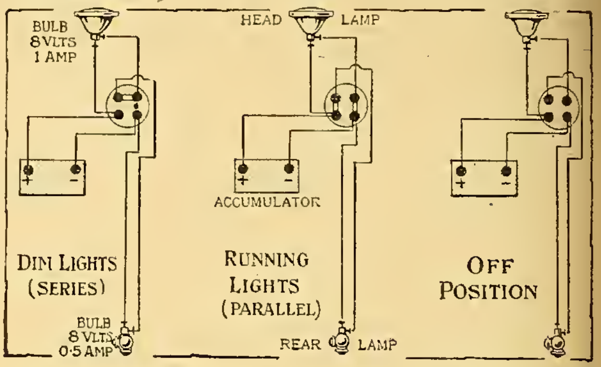
1. Wide suffused light for foggy nights or a long penetrating beam for speedy runs, instantly convertible.
2. A beam of light which enabled me to read the inscription on a penny at thirty-five yards—this with a bulb of .4 amp.
3. Bulbs are interchangeable, so if that in the head lamp fails one can borrow from the tail lamp to get to the next town.
4. Any old village stocks these flashlight bulbs.
5. As a test, my accumulator just lasted out for three weeks at half an hour a night, though in regular use I leave it on charge all day every other week.
6. The set has been in regular daily use from the spring of 1915 until the end of last year, and it has never given me a minute's trouble: the accumulator has therefore been shaken and dithered for over 10,000 miles without receiving any injury.

What more can anyone want?

ALLON.

Birmingham.

Sir,—In reply to Mr. Percy's lighting query, I think his 12 c.p. rather high, and should suggest 8 c.p., or he will find trouble in getting an accumulator to fit on his cycle, as it would have to be rather large to last any time. Herewith I give connections that will work well, using one of Lundberg's series—parallel and off switches—which can be obtained from A. P. Lundberg and Sons, 1-6, Paradise Passage, Islington, London, N.

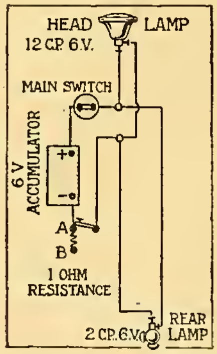


The switch can be fitted on the accumulator box, and makes a neat job.

An eight-volt 40, 60, or 80 amp.-hour accumulator should be used according to the room available. The rear lamp should be eight volts, 0.5 amp. 4 c.p. taking only half the current of the front lamp and giving less light, and a resistance may be inserted if necessary about 8 or 10 ohms; a lamp of this sort takes one watt per candle-power, or one volt × one amp. per candle-power. Osram bulbs are good and reliable and are guaranteed. He can obtain exactly what he requires at the Economic Electric Ltd., 10, Fitzroy Square.

L. J. HEALE.

In answer to Mr. Percy's enquiry *re* wiring for solo mount in your issue of the 7th inst., possibly the enclosed diagram will help him.



For ordinary running purposes the key is in position A; for leaving the machine while in town the key is placed at B, thus putting the one ohm resistance into circuit. This will reduce the candle-power of the front lamp to three, and that of the rear lamp to a half candle-power.

I should suggest that two candle-power is the least one could use for running in the normal way (I refer, of course, to the rear lamp). Anything less would insufficiently illuminate the rear number-plate.

In answer to Section 2 of the letter, I should suggest a 60 amp. hour six volt accumulator, as this would give approximately fifty hours continuous light if the lamps indicated were used, and would also be comparatively light and small. If expense is no object, I should suggest an Edison accumulator.

Sections 3 and 4 are already answered. Section 5, the Osram lamp is a very good one. Half watt lamps should be used.

I regret that I am unable to offer any suggestion as to where he might obtain these accessories.

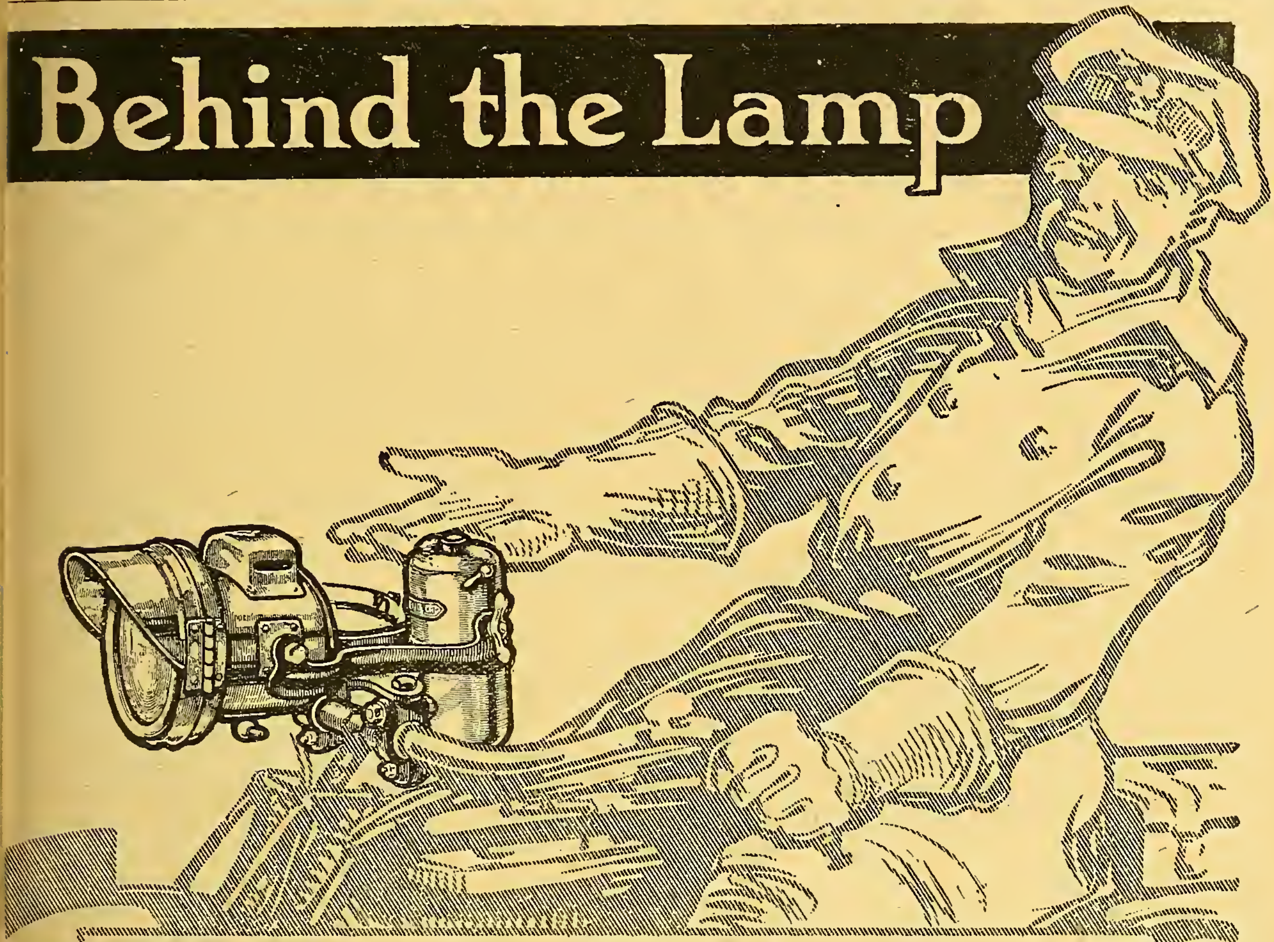
WILBERFORCE DURELL.

GOODS MADE IN GERMANY!

Sir,—I cannot let your controversy on "Goods made in Germany" pass without dipping in my oar. As an old reader, I may say that I consider you have made a tactical error in printing your "Important Notice" weekly, as in years to come you will not be able to keep to the sentiments expressed therein. I thoroughly agree with the letter from your contributor, Mr. Ives, except for the fact that he stopped his copy of *The Motor Cycle*. However, this is a personal fancy. *Chacun à son goût*, and, given time, you will no doubt recover from this unquestionably staggering blow.

I may say I am not entirely a peace crank or a "no conscription" maniac, having joined H.M. Forces before the outbreak of war, and living as I do in the hope of at least another twenty years' service.

Behind the Lamp



Behind the Lamp, the rider—in front, the danger! There, in a word, you have the reason why this item of equipment should be selected with the utmost care. The danger is no longer danger if the headlight really points the way. But the Lamp of inferiority will never fulfil that purpose as the

MILLER

will—hence, hesitate before you buy another. The Miller Catalogue tells you all about all Miller Models, and the Motor Cyclist who has used them, or the Retailer who sells them, will tell you more than we can of their merit.

H. MILLER & Co. LTD. Light Specialists, BIRMINGHAM

On a good thing

We have known men who have fancied themselves on a real good thing when buying a "cheap" tyre—we have known the same men realise from bitter experience that no tyre is "cheap" which is not good.

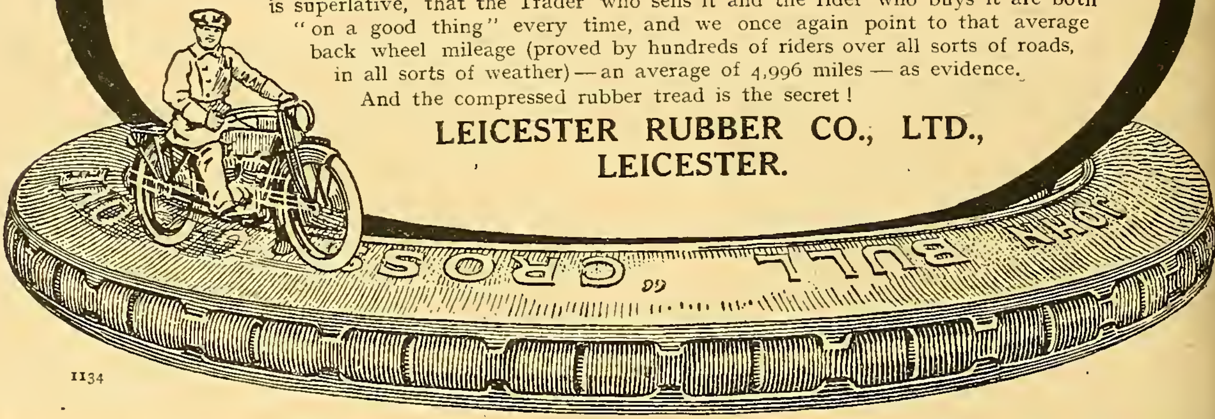
We claim that the

JOHN BULL

is superlative, that the Trader who sells it and the rider who buys it are both "on a good thing" every time, and we once again point to that average back wheel mileage (proved by hundreds of riders over all sorts of roads, in all sorts of weather)—an average of 4,996 miles—as evidence.

And the compressed rubber tread is the secret!

LEICESTER RUBBER CO., LTD.,
LEICESTER.



1134

Smart, yet Practical, and Perfectly Waterproof.

PLANNED on the saddle, so to speak, these garments combine smartness with perfect ease and freedom. Built of Paramatta Twill of the finest proofing, they are quite impenetrable to wind and rain. They are guaranteed absolutely waterproof, and the quality is unequalled anywhere for the price.

Jacket with Belt - £2 10 0
Seatless Trouser Overalls, £1 8 0

Dunhills, Ltd.,

2, Conduit St., Regent St., W.
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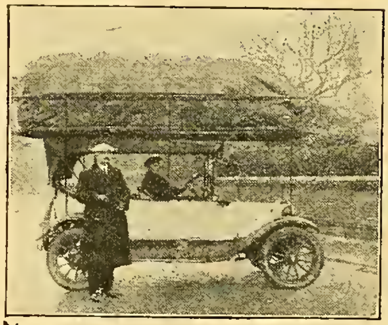
90 & 92, Cross Street.

Glasgow:
72, St. Vincent Street.



Coal-Gas.

COAL-GAS-propelled MOTOR VEHICLE OWNERS should adopt as a standard lubricant

COAL-GASTROL

C. C. Wakefield & Co., Limited, having caused exhaustive tests, extending over 1,000 miles, with Coal-Gas as the motive power, to be made by their expert to discover the best grade of lubricant to be used with COAL-GAS, have no hesitation in recommending

WAKEFIELD
Coal-Gastrol Motor Oil

as *the* oil for this purpose. Increased power, smooth running, and absence of carbonization are features prominently associated with the use of this lubricant. COAL-GASTROL is a CASTROL grade with the Wakefield guarantee.

C. C. WAKEFIELD & Co., LIMITED
(Sir Charles Wakefield, Bart., Governing Director).
WAKEFIELD HOUSE, CHEAPSIDE, LONDON, E.C.2.

Why is it that manufacturers will paint their names in huge letters on the tank? I seldom remember seeing Rolls-Royce in enormous letters on the bonnets of cars. Nothing ooks worse, and although one can always paint out the name on a new machine, this should not be necessary. There are one or two machines, such as the Rover and Triumph, the manufacturers of which refrain from this regrettable practice; but they are the exception.

In all sincerity, I would say, is it not time we had reverse gears fitted to heavy sidecar outfits? They would be invaluable for turning in a narrow road and backing out of the garage, and although the spectacle of a man riding his machine solo and putting in the reverse by mistake would not be other than amusing, this need not occur with care.

TAMPION.

c/o G.P.O.

Sir,—I am going to write you my opinions, such as they are, on the controversy that rages in your paper over the notice you so praiseworthily publish on "Goods made in Germany." If you think fit, please print them. They are crudely put and roughly written, but on Active Service one is excused much.

I can quite understand that the advisability of publishing such a notice is a debatable question: there are points for and against that have to be carefully considered before coming to a definite conclusion.

Mr. Ives's views apparently are these. He would wish to prevent Germany from regaining her strength after the war because she has used to such fell purpose the strength she acquired by trade before it. But he considers that the extreme measure denoted by the announcement to which he objects is impossible, because impractical. He must, I think, be considering the matter retrospectively, and recalling to mind the huge English market for German goods. He remembers how that was obtained, and knows that human nature is too weak to fight against the impulse to buy the cheaper article, without regard to a patriotic motive. He decided then that the notice you publish cannot be maintained, and conscientiously lodges his complaint.

But, let him consider this: that Germany will commence after the war seriously handicapped. Not only will she have to overcome the nauseating feelings that decent people have for the Kultur spirit, but she will find her trade not merely interrupted but absolutely broken. She will want to advertise—no success is possible without that—and the prevention of this will make it well nigh impossible for her to compete with British firms and secure the position she had four years ago.

We have a fight before us no doubt, but success is absolutely essential. To achieve it we must discourage German trade (to prevent it, of course, would be the ideal), and we must encourage English trade to larger and consequently cheaper productions by securing it an increased market.

There is another point that has occurred to me, and, if you will permit me, here it is.

Germany must know of our feelings towards her post-war trade. Even now she will attempt, if possible, to counteract them by every underhand means in her power. To do it openly is as yet impossible, and even un-Hunnish; but how about her scheming in a manner similar to that adopted by Mr. Ives?

In saying this I merely wish to explain my point, and hasten to offer my humble apologies to the gentleman named, who, I have not the slightest doubt, has been impelled by motives the most sincere and patriotic. I am sure that if he should consider the question again he will be brought to think with me. This indeed is the sole purpose of my letter.

PHILLIP J. ADAMSON, 2nd S. Lancs. Regt.

Sir,—I should like to protest at the tone of the letter on the above subject, signed "Briton." Abuse of a person, because he holds certain views, is no argument. I do not for a moment agree with F. Jones and others who write and threaten to stop reading *The Motor Cycle* because of its attitude to German goods, for they give themselves away by their words, *i.e.*, they are threatening to boycott you just because you suggest boycotting German goods. In a word they are going to do the very thing they condemn. But abuse is not argument against them.

There is, however, another side to the question of not using German goods after the war. The German peoples will have to live after the war, as "X.Y.Z." in his reasoned letter says, and though we all hate the German methods of war, to me this boycott seems like hitting a man when he is down, and this is unsportsmanlike. If we beat the German nation, they will be the men who are down and out. Why go on kicking them then? Hundreds and thousands of the German people are just as innocent as the folk at home; they no more wanted this war than we did. Are we to go on making misery and suffering for the innocent, when all this present suffering is over?

By all means tax German goods after the war, or find some means of preventing the German nation from accumulating riches for the prosecution of a new and more terrible war. You will not, however, do it by stopping trade with the huge population of Europe. Boycott of German goods will continue the hatred, and father the determination to "have their own back" as the boys say.

We, too, have goods that the Germans want for industry and trade, and wholesale boycott of German goods seems to me to imply wholesale boycott for English goods in Europe (Central).

Let us be reasonable. Granted we win, let us remember that all ethics and morals point out most clearly the following:

When a war, for just cause and through necessity, is undertaken, it should be carried on, *not for the ruin of the nation against which we fight*, but for *securing the rights of our own nation and the Allies, and* in order to obtain *peace* and *security*. Having gained our victory, we should deal moderately and with Christian charity (are we not crying out because the Germans are violating the ethics of Christianity?) towards the conquered, and consider ourselves as a judge between the States, the one which is injured and the one which has inflicted the injury, but we should not act as avengers, but as a judge bound to preserve the *just rights* of both sides.

If we are going in for boycott for the sake of revenge, then we shall put ourselves and our cause on the wrong side, and for just this reason I very much deprecate the cry of "Boycott German goods"—in other words, Do not be sportsmen, but go on kicking the chap when he is down and out in the fight.

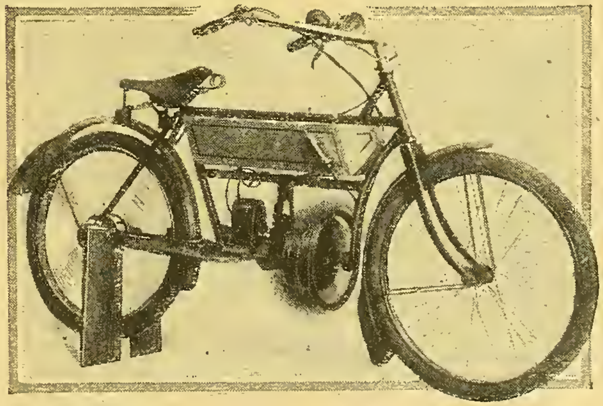
R. C. MEASURES (REV.).

ACCESSIBILITY.

Sir,—I have read the article *re* American and British motor cycles with great interest, and note one query that, I think, cannot but give some little misconception of my firm's machine.

Speaking of "really vile faults," it is asked, "Does 'Chinook' know of a big four where it is necessary to drive out the gudgeon pin, after slightly lifting the cylinder, ere the cylinder can be removed?"

I know of no other machine sold as "big four" than the Norton, and such necessity in the case of this machine certainly does not exist. In no Norton model is it necessary to disturb any part of the engine in order to remove the cylinder, except the cylinder itself. JAS. L. NORTON.



In view of the present interest in rotary engines, we illustrate a motor cycle described in August, 1912. It was built by the Gyroscopic Motor Syndicate, Ltd., and photographed whilst the engine was revolving at 4,000 r.p.m. The photograph of the machine is quite sharp, demonstrating that the engine was practically vibrationless.

"THE OLD QUESTION."

A CORRESPONDENT has been taking me to task over my remarks in a recent article showing my preference for a four-stroke, except as a short distance mount. The writer, who is a sergeant-major in the Inns of Court O.T.C., is the satisfied owner of a 2½ h.p. two-speed two-stroke Allon. It was purchased early in April of last year, and has been a source of pleasure to himself and wife ever since. He goes so far as to say that his machine is as good as any on the market and better than many. It has done a good mileage this season, and goes as valiantly as ever.

It is early days to speak of any machine's good wear or otherwise; the first season should be the most inexpensive as regards replacements and spares. Without being pessimistic, I would remind him that there are many sides of motoring, but the joys outweigh the disadvantages in most cases, otherwise fewer people would ride. His wife, too, has learned to drive the machine, and by taking turn and turn about from saddle to carrier they have during the past summer travelled long distances during week-ends and have felt little weariness after many miles. I quite agree with my correspondent's high opinion of his two-stroke, but this is not unusual behaviour for any good mount, not necessarily two-stroke or four.

I have never owned an Allon, that is one of the few makes of which I have no personal experience. Perhaps after the war I may have the pleasure of closer acquaintance, and then I hope to be able to endorse all his kind remarks, which are most complimentary to the manufacturers. Sgt.-Maj. James says: "There are no valves to grind in, no timing gear to slip, and one-third the number of parts; all is simplicity and elegance." These remarks reek somewhat of the professional salesman. Were they picked up, I wonder, at the same time as the machine? I hope I am not doing him an injustice.

The machine has been ridden through Oxfordshire and Berkshire on journeys of over a hundred miles without once needing the use of the second gear. On military business, of course——!

Running Costs.

Mrs. James on her Allon two-stroke.

His statement of mileage and cost up to the end of October last is most interesting. Very few riders have such a long purse that ways and means can be ignored. For a person whose motoring knowledge at the date of purchase was practically *nil*, they are by no means exorbitant; 1,930 miles are recorded for the season's riding at a cost of £5 19s. for fuel and slight repairs. This works out at considerably less than 1d. per mile, and under last summer's adverse conditions, but another £3 11s. 6d. has been expended for extras; that is, spares that have not yet been needed—a new belt, front and rear lamps, and licences for himself and wife. These latter, I consider, should really be placed in the running expenses, as they require renewing each year.

Having watched the operation of taking down the engine, Sgt.-Maj. James can manage to do all the decarbonising necessary, and when the Allon begins to four-stroke its cylinder is removed; a judicious cleaning repays by ease of starting and regular running. This is most creditable for one who is almost a beginner. I am always pleased to hear the views of correspondents, especially those whose enthusiasm has not been damped—or shall I say diluted?—with the weird mixtures thrust upon the long-suffering motor cyclist in place of Shell I. and mixtures, however poor they may be.

MAY WALKER.

Mr. Macpherson, replying to Sir W. Dickenson in the House last week, said: "It has been decided that, with the exception of a comparatively small number of men who will be retained to perform definite duties, such as guards, etc., no volunteers will be kept in the force after March 31st next who have not undertaken to serve until the end of the war and to perform a certain programme of training."

THE SOCIABLE SIDECAR.

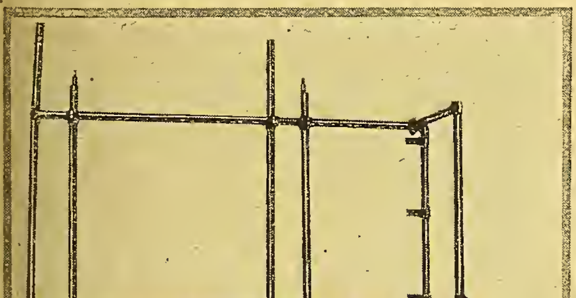
A Type of Passenger Motor Cycle which may have its Share of Admirers in the Future.

We have already referred to the possibilities and probabilities in front of the side-by-side sidecar which seats not only the passenger n the strict sense of the term, but also the driver of he machine. In a recent article on sidecars we mentioned an early machine of the type known as the H.S.M., and we have been interested to receive from the designer of this machine particulars of his latest and improved model.

The main innovation in the new model consists in the utilisation of a one-piece underslung chassis unit, and this, of course, is in itself an entirely commendable and only too uncommon a practice. It has been more than once suggested, indeed, that the sidecar and motor cycle combination of the future even when built after those lines that are at at present regarded as conventional, might advantageously be built up in one piece, in so far as frame construction alone is concerned. The disadvantages of numerous connections that may become loose are too well known by all experienced riders, and, while there is no doubt that the single unit construction has some drawbacks, there should be little room for doubt that on the whole it is far ahead of the rival system.

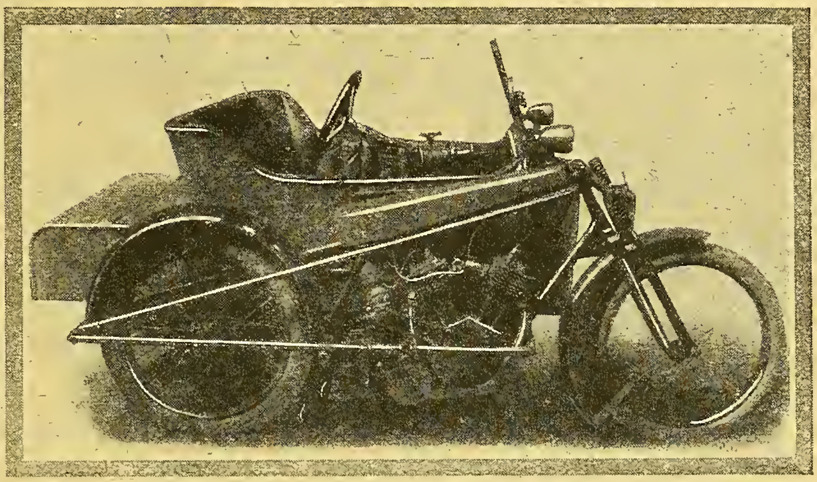
Constructional Details.

The springs are of the semi-elliptic type, the chain adjustment is by means of eccentrics, and all the wheels are detachable and fitted with internal expanding brakes. We are informed that improved shock absorbers are fitted, but are given no details as to their nature, and they are not visible in the illustrations we are able to reproduce.



The chassis of the sidecar is integral with the frame of the machine.

These illustrations make many points of the construction clear, and it will be seen that transmission is by means of countershaft and chain, the countershaft also containing, of course, a three-speed gear box (of Chater-Lea type apparently), allowing for handle starting of the engine. Naturally full provision is made for all driving control to be from the inside of the car body—and it may be incidentally noticed that this body is much more after conventional car lines than is usually the case in a vehicle of this type. The wheel steering is also claimed to be of the irreversible type, but how this very desirable feature is attained we are not told. The mudguards, as may be seen from a close inspection of the complete machine, are attached not to the body, but to the frame, so that when the body is removed the mudguards are not disturbed.

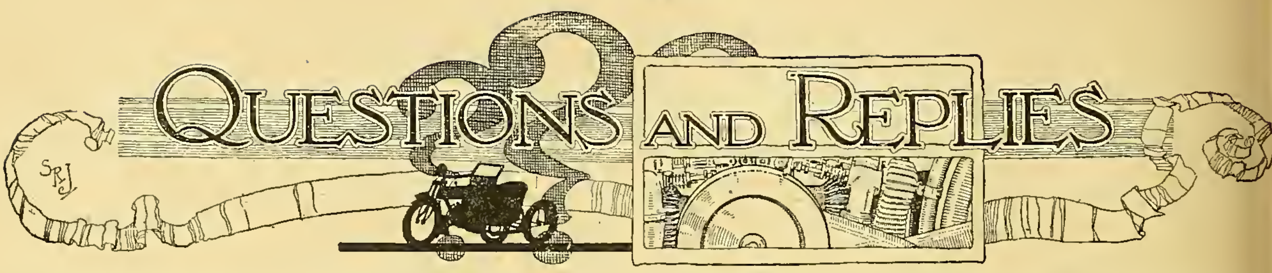


The most recent design of the H.S.M. sociable sidecar.

Future Prospects.

The name and address of the maker are F. Hellens, 151, New Cross Road, Deptford, S.E., but we may assure readers they are likely to obtain little satisfaction from writing to Mr. Hellens, as he is too busily engaged on more important work to attend to the sidecar business as he would like to, and he has had to postpone many anxious enquirers till *après la guerre*, when he hopes to market his product under the name of the Hellenson.

Two names well known to our readers appear in the list of members of the new Road Transport Board: Sir Evan D. Jones, head of the Petrol Control Department, is chairman, while one of the members is Col. H. N. Foster, Assistant Director of Supplies and Transport, War Office. Col. Foster was one of the original M.T. officers in the Army. He was a captain when the war began, is now a full colonel, and was a member of the Mechanical Transport Committee before the M.T. Section of the Army Service Corps was founded.



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Use of Petrol for Testing.

I recently bought a second-hand motor cycle. May I legally run it on the road for testing?—S.P.

Under the Motor Spirit and Gas (Consolidation) Order, 1918, you are allowed to make a journey not exceeding twenty miles in connection with the sale of a motor car or motor cycle, provided permission is obtained from the superintendent or local chief officer of police, who will issue a permit if he thinks the case one able to justify his adopting such a course.

Intermittent Firing.

I have just overhauled my Allon two-stroke, and on trying it on the road I found it had developed a habit of intermittently back-firing through the carburetter. This occurs mostly on low gear and at slow speeds. At faster speeds the machine runs well, with only an occasional back-fire. The carburetter (Amac) is quite clean, the magneto set just to break with the piston at its highest position, and spark lever in fully retarded position.—S.A.H.

We should say that the trouble is likely to be due to the jet fitted being of incorrect size, and we should therefore recommend you to try the next size smaller, and if that does not suffice the next size larger.

Water Injection.

I notice in a recent issue a suggestion that a drop of water let into the cylinder on the suction stroke has certain advantages. What are they? Again, I fail to understand why, when a drop of water gets into the tank or carburetter, it stops the engine. Why should it do so in this case and not in the way suggested by your correspondent?—H.G.

The drop of water has some effect in aiding the explosion, owing to the fact that it is turned into steam immediately and expands. It also prevents knocking, and consequently the engine is claimed to run more sweetly. With regard to water in petrol, this has an exceedingly evil effect. Water and petrol do not mix; the water, being much heavier, consequently falls to the bottom, rolls about the tank in globules, and if it gets into the petrol pipe it drops down and accumulates at the base of the jet, preventing the flow of petrol.

Loss of Power.

I have a 1914 motor cycle fitted with a 2½ h.p. Precision engine. Lately the machine has lost a great deal of its power, and will not take a hill of any serious gradient without assistance of the pedals. The machine is only fitted with one speed. Do you think it would be any real improvement if I fitted it with a two-speed hub? The machine goes excellently on the flat, but seems to be unable now to negotiate a hill.—H.J.

Certainly with such a low-powered machine we should say that a two-speed gear of some kind would be a very valuable asset. Evidently the machine wants thoroughly overhauling—valves grinding in, worn parts replaced, etc.—and this want accounts for the loss of power.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

T.T. History.

I am thinking of purchasing a second-hand Matchless motor cycle. It has a 4-5 h.p. overhead valve J.A.P. twin engine, a variable gear on much the same principle as the Zenith, but operated by a lever, and it has a round tank. I am informed by the owner that this machine was ridden in the 1914 T.T. Would you please let me know (1) if a machine of this description has competed in the T.T.; (2) if so, who rode it; and (3) state where it came in? Also would you let me know (4) its probable speed when new?—P.J.H.

(1.) Yes; a machine of this description did compete in the Tourist Trophy Race, but not in 1914. It was in 1912. (2 and 3.) It was ridden by H. A. Collier, and finished third. (4.) The average speed in the race was 46.5 miles an hour, which probably means that at times the speed was well over sixty miles an hour.

Use of Fuel.

I have a little petrol, part
which I had left on my ol
licence of more than a year ag
I am engaged on aircraft worl
and have to walk three mil
very early in the morning owing
restricted train service. Should I
allowed to use up my petrol and an
other I could obtain, or paraffin,
get to and from my work? I wish
be sure, as I am not going to rene
my licence if I am not allowed to u
my machine.—H.P.

The best course for you to adopt woul
be for you to consult the police in t
district in which you do your ridin
The decisions of individual benches
magistrates vary to such an extent th
it is impossible to give any general rulin
You appear to be unaware that paraff
or any other liquid comes under exact
the same restrictions as petrol, if used
fuel in a motor.

Hardening.

I intend fitting four ne
gudgeon pins in a four-cylind
F.N. (1.) What kind of ste
is best for these? (2.) In cas
hardening them, what is a goo
compound to use, the correct heat
which to keep them, and for ho
long? A few details as to cas
hardening would be acceptable.—H.L.

(1.) Gudgeon pins are usually made fro
some good quality mild case-harden
steel. (2.) Various compounds are use
depending on the plant available f
carrying out the job. To harden such
thing as a gudgeon pin satisfactorily,
should be packed in a pot with Kasen
Scintilla, or some other hardening co
pound, and heated for a period in t
furnace, after which it should
quenched in oil and then tempered. T
probability is that, if you have to
the job with the ordinary amate
appliances, you should put the finish
pin into a hearth built up of charco
and bring to a red heat with a bl
lamp, and then continually apply cryst
of ferro-prussiate of potash for so
little time, so that the ferro-prussiate g
well soaked into the metal. After t
the article is quenched dead hard a
tempered. In tempering, first of
brighten the part with emery cloth, a
then heat it till it turns a dark str
colour, and at this instant quench imme
ately in water. To make a satisfact
job of such a large part as a gudge
pin with amateur appliances is not ea
and it is doubtful whether you will eff
this unless you are experienced.

Loss of Power.

I have a 2½ h.p. two-speed two-stroke motor cycle, which ran well until a short time ago. Now it does not pull so well on hills, and when hot it loses power very quickly, even on a slight incline. The bearings are good, and also the compression shows no leakage. I shall be much obliged if you will kindly say to what you attribute the loss of power. The machine is a late 1914 model, and has had little and careful usage. The rings are not gummed or stuck in any way.—F.S.

t is rather hard to say what is the matter with the machine without actually seeing t. We should be inclined to think, how-ver, that an improvement could be effected by fitting a smaller jet. Of course, if the machine has been used for a long time, perhaps a new piston and rings are necessary.

Unequal Compression.

I have a 5 h.p. 1915 American twin, and find it very difficult to keep the compression good and approximately equal in both cylinders. When I put new rings on the pistons the compression only keeps good for 200 or 300 miles, although both cylinders get plenty of oil. There are only two rings on each piston, and the gaps are all cut the same way. If I put on rings with step-cut gaps, do you think they would hold the compression any better? How are the rods that hold the cylinder heads down removed from the crank case, so that I can get the cylinders off to fit new rings?—T.D.

A good many people have this difficulty with twin-cylinder engines. The thing to do is to find out where the leakage of compression is. It may not be at the rings at all. Step-cut rings may improve the compression, if the leak is at the rings. To the best of our recollection the rods are screwed into the crank case, but there is no necessity to disturb them, as the engine must be removed from the frame. When the nuts have been undone, first the head will come away, and then the cylinder.

Hub Gear Trouble.

I have a 4 h.p. Bradbury motor cycle fitted with an Armstrong Mark II. hub gear. Will you kindly inform me (1) how I can get the clutch to pieces, as I think it has got fixed and will not release? I cannot get the rod in the spindle to push in, and so cannot get free engine. (2.) Is this hub suitable for sidecar work with gears of 4, 5, and 7 to 1? (3.) Can I get the valve guides out of the cylinder without damaging them, and how? (4.) What is the valve and magneto timing for this machine with sidecar?—W.G.

(1.) Instructions as to taking the Armstrong gear to pieces appeared in *The Motor Cycle* of December 7th, 1917 (a copy of which issue will be sent to you post free on receipt of 3d.) If this does not give you the information required, we should recommend you to get into communication with one of the firms who advertise in *The Motor Cycle* as specialists in Armstrong gears. As regards adjusting the clutch, it is important that the operating mechanism, consisting of a bell-crank lever, should be screwed on to the spindle the correct distance, so that the push-rod lever rests upon the spindle thread within $\frac{1}{32}$in., in order to ensure the correct transmission on the push rod inside the cone spindle. (2.) The hub will do for sidecar work, but the ratios are much too high, the correct ratios being 5½, 8, and 11 to 1. (3.) If the valve guides are not cast in the cylinder (Messrs. Bradbury and Co. made, as well as this pattern, a type in which the guides were driven in), and if yours are driven in, they can be punched out with care without being damaged. (4.) The inlet opens 12°, or 1 mm. past the dead centre of the top of the stroke, and closes 33°, or 7 mm. past the bottom of the stroke. The exhaust opens 16 mm. from the bottom of the stroke and closes 1½ mm. past the top of the stroke. Set the magneto points to break with the piston on dead centre and the ignition lever two-thirds retarded.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week.

Remagnetising Magneto Magnets.

I have a magneto which requires remagnetising. Will you kindly inform me the correct way to proceed, as I have a dynamo, accumulators, and light from town's installation?—J.F.

As you have had no experience of remagnetising magneto magnets, we should not advise you to attempt it. There is far more in the process than you appear to imagine, and we regret that a full description of the necessary apparatus would occupy more space than could conveniently be devoted to it on this page. Also the cost of the apparatus would probably considerably exceed that charged for remagnetising by a firm who make a speciality of this work. Again, a slight mistake would injure the magnets.

RECOMMENDED ROUTES.

TIDWORTH TO LEICESTER.—A.W.

Tidworth, Hungerford, Wantage, Oxford, Banbury, Southam, Rugby, Lutterworth, Leicester. Approximately 120 miles.

WIDNES TO MANSFIELD.—G.J.

Widnes, Warrington, Knutsford, Chelford, Macclesfield, Buxton, Bakewell, Chesterfield, Mansfield. The road is hilly between Buxton and Mansfield.

ENFIELD TO BOURNEMOUTH.—C.E.M.

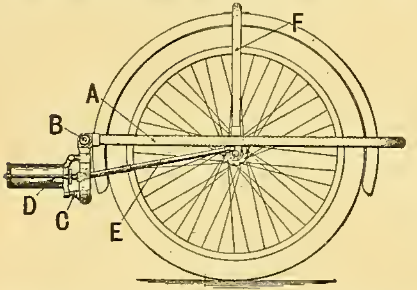
Enfield, Chase Side, Barnet, Elstree, Wealdstone, Greenford Green, Greenford, Norwood Green, Hounslow, Staines, Egham, Bagshot, Blackwater, Hartley Row, Basingstoke, Winchester, Romsey, Cadnam, Lyndhurst, Christchurch, Bournemouth. The first part of the route from Enfield to Hounslow is the road marked in blue on the R.A.C. Official Map of Recommended Routes Round London (obtainable from these offices, price 1s. 10d. post free). Return *via* Winchester, Kingsworthy, Alresford, Alton, Farnham, along the Hog's Back to Guildford, and through Chertsey to Staines. Thence as above.

French D.R.'s chatting in a tree-lined road in France. The quality of the roads leads one to surmise that the scene is far from the Front.

PATENTS by Eric W. Walford

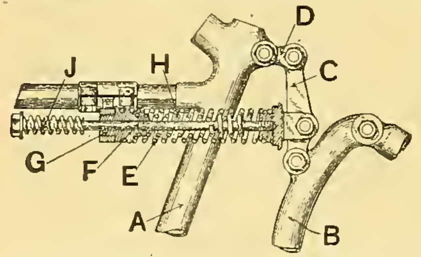
Sidecar Wheel Suspension.

The sidecar wheel is mounted in a member A, which may extend completely around the wheel, and is pivoted at B to the frame. Projecting downwards beneath the pivot B is a rigid member C, supporting a cylindrical chamber D, in which is arranged a spring device that may consist of a single spring acting in both directions, or two separate springs working oppositely. The spring system is connected to a point near the wheel spindle by a rod E, so that as the wheel rises and falls the rod E is moved, actuating the springs, and damping out the shocks. The wheel-carrying frame is further strengthened by an arched member F, which extends completely across the wheel, so that a very strong and neat construction is provided.—W. Douglas, No. 111,589.



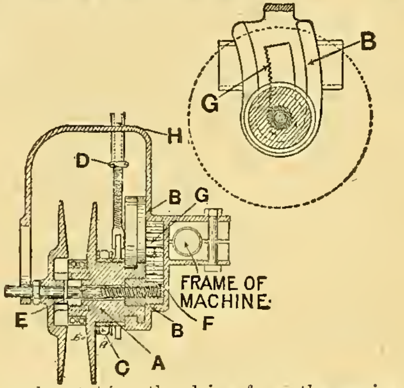
Rear Springing Mechanism.

A indicates the main frame, and B the upper portion of the rear sprung frame. The feature of the invention consists in the springing. It will be seen that this comprises a large main spring E, which is anchored at both ends so as to act both in tension and compression. Further, a rod F is connected to the link C, and passes through the abutment G carried by the main frame. Upon this rod, and inside the main spring E, is a second spring H, whilst a third spring J is threaded upon the rod in front of the abutment G. The springs H and J have some clearance at one end. Thus, for light shocks the main spring E only comes into operation, but when heavy shocks are sustained and the spring E is considerably deflected, one or other of the auxiliary springs H or J is brought into action, supplementing the spring resistance and preventing fracture. — W. Douglas, No. 110,272.



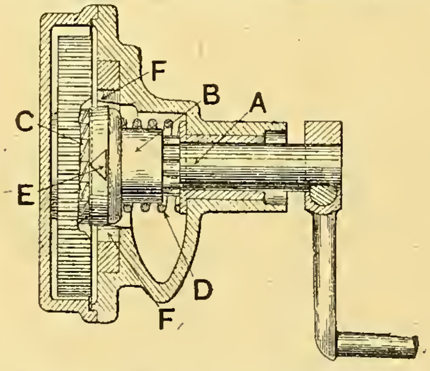
A Variable Pulley Gear.

The body of the pulley A is movable in an arc having the centre of the engine-shaft as centre and is guided by a member B forming part of the frame. The sprocket taking the drive from the engine is shown at C, and the sliding movement of the pulley is brought about by the screwed rod mechanism D, operated from a cranked handle (not shown). Passing through the pulley body is a screwed stem E, upon which threads a nut F formed with teeth which engage a rack G, so that as the pulley slides in its guides the rack actuates the nut F, causing the stem E to actuate the movable pulley flange G. Thus, the pulley adjustment and the belt tension are varied simultaneously, and the parts are so disposed that the adjustments are proportional.—A. C. Muir, No. 111,761.



An Ingenious Kick-starter.

The starter-shaft A is provided with a clutch member B, which is free to slide, but not to rotate thereon. The clutch member has ratchet teeth corresponding with similar teeth on the gear wheel C, and these teeth are caused to engage by the pressure of a spring D. In the drawing the device is shown at about half stroke in its operation. On the clutch member B is a projection having inclined faces, and corresponding faces F are provided on the casing, the inclines being such that at the end of the stroke the projection E and consequently the clutch B is caused to move back against the spring D, disengaging the ratchet teeth. The starter is drawn back to its initial position by a spring, which is not shown in the drawing, so that the projection E is engaged by one incline F, and when not in use the starter is positively held clear of the teeth carried by the gear wheel C.—Triumph Cycle Co., Ltd., and G. E. Stanley, No. 111,759.



SPARKLETS

Friction Springing for Motor Cycles.

We are informed that the spring frame design shown on page 74 (January 24th) is now fully patented for application both to motor cycles and pedal cycles.

Home Enamelling.

Those of our readers who desire to re-enamel or touch up their motor cycles should apply to Messrs. Jenson and Nicholson, Ltd., Stratford, London, E.15, the makers of Robbialac, for their latest pamphlet on this subject. This contains much useful information.

Rumours of Amalgamation.

A rumour has been widely circulated to the effect that Auto-Carriers, Ltd., is about to be amalgamated with a large firm engaged in Government contracts. We have been requested by the company to deny the statement, which is wholly unfounded, no move in the direction suggested being in contemplation.

Increase of Prices and Suspension of Models.

Owing to increased Government demands, Messrs. H. Miller and Co., Birmingham, have been compelled to suspend certain models contained in their current catalogue. Prices are also advanced in accordance with a new scale which came into force on January 14th. Enquiries are invited, and full details as to the models suspended and the new prices referred to will be supplied on application.

Goodyear Provincial Showrooms.

The Goodyear Tyre and Rubber Co. (Great Britain), Ltd., inform us that, although their provincial showrooms have been closed for the duration of the war, their premises at 3, Southgate, off King Street West, Manchester, are still open for the despatch of goods, while they still fit solid tyres there for heavy commercial vehicles for Scotland and al the North of England.

Simplicity.

The New Rover Cycle Co., Ltd., Coventry, have received an interesting letter from a captain in the Army attached to the Hythe School of Musketry. He informs the manufacturers of his machine that, having injured his leg and so having time at hi disposal, he decided to clean his machine, and without leaving his chair he was able to remove the cylinder, scrape the piston and combustion head, and replace it in an hour. "I have never bothered to do this myself before," he writes, "most machines being so inaccessible, and I think it speaks well for the design of the 1917 Rover. I have found the machine most surprisingly powerful, capable of taking a heavy passenger and sidecar anywhere." This is certainly a testimonial of which the New Rover Cycle Co. may be justly proud.

A posse ad esse

THE MOTOR CYCLE
ESTABLISHED IN 1903

AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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British Magnetos.

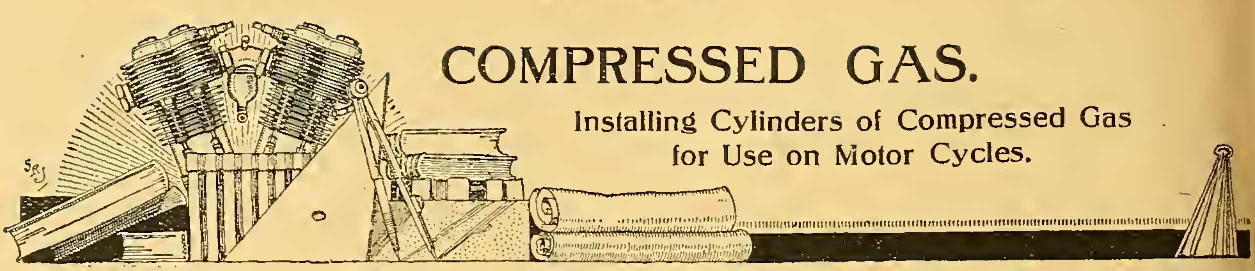
FOR many years we have urged the importance of making magnetos in Britain. This subject was first touched upon before the war, both in our pages and in those of our parent journal *The Autocar*. The dangers of allowing so important an industry to remain in foreign and possibly hostile hands was then vigorously pointed out. Naturally, in the fateful days of August, 1914, when we were faced with the very dangers we had foreseen, the magneto question became one of supreme importance, and our readers will doubtless remember that we left no stone unturned to further the object we had in view, viz., the perfecting and manufacturing of the British magneto on a really adequate basis.

Our efforts were quickly rewarded. The magneto manufacturers, instead of being numbered by ones and twos, became more numerous, and the outputs rose from tens per week to hundreds, and even thousands. Our American cousins, too, came to our assistance, but they, like ourselves, lacked the experience of the Germans. At first the instruments which we turned out could hardly be described as satisfactory. They worked, it is true: some well, others badly; but the general workmanship and finish left much to be desired. Of course, this state of things did not last long. Better plants were laid down, experience showed how defects could be remedied; better organisation led to increased output, and the British magneto became equal to anything of the kind in the world, and superior to most.

In view of these facts it will be readily understood that we were much surprised when it was stated in a recent lecture that it was probable that the British motor trade would have to return to the German-made magneto after the war, because the supply of British magnetos would be totally insufficient. In our report of this lecture we called this "An Extraordinary Statement," and, we think, with reason. There is no prospect of a shortage of British magnetos; in fact, the magneto makers are wondering whether there will be a demand for their whole output after the war, and are contemplating the necessity of turning part of their extensive plant into other channels. During the past week we have visited three of the largest magneto works in the Midlands, and what we saw in these works leaves no doubt in our mind but that the full demands of the British automobile trade will be most adequately met, and that the quality of the instruments will leave little or nothing to be desired. British magnets are far superior to the German, and consequently the British magnetos will give a much better spark at low speeds. The insulating material, too, is much better, as has been proved by the most searching tests at the National Physical Laboratory; in fact, the British instrument has nothing to fear from the most careful comparison with the product of any other country.

It has been said that we do not know what the Bosch firm will put on the market after the war. This is partly true, but we know what the firm is producing at present, for the German aeroplanes which crash in our lines constantly afford us opportunities of examining the latest Bosch practice. It is inconceivable that any but the latest and best that Germany can produce will be fitted to her fighting aeroplanes, though it is, of course, possible that further improvements may be made before the cessation of hostilities. This, however, applies to this country just as much as to Germany. The British firms have equipped large experimental workshops and research laboratories, where investigations are being constantly made with regard to further improvements, and nothing is placed on the market without thorough test.

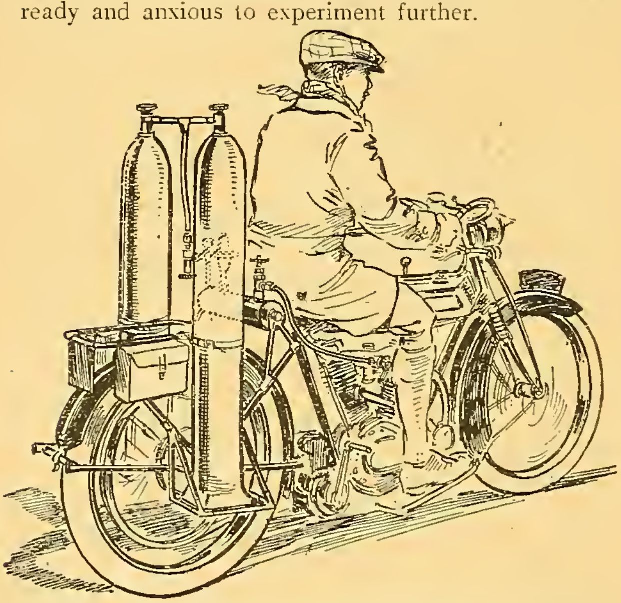
We have purposely refrained from giving figures, but our statements are based on figures that we have seen. Moreover, adequate proof has been placed before us that the British magneto is proving entirely satisfactory.



COMPRESSED GAS.

Installing Cylinders of Compressed Gas for Use on Motor Cycles.

OUR readers have for some time been familiar with the method of carrying gas in fabric containers, which are bulky, offer a large wind resistance, and hold a remarkably small amount of gas for their size. The firm of Messrs. Flugel and Co., 33a, Green Lanes, Newington Green, London, N., have for a long period studied the question of installing cylinders of compressed gas on motor cycles, and are ready and anxious to experiment further.



A suggested method of carrying gas under pressure on a motor cycle. Each cylinder weighs 47 lb. and can be made to hold ninety cubic feet of gas. The reducing valve is shown immediately behind the saddle.

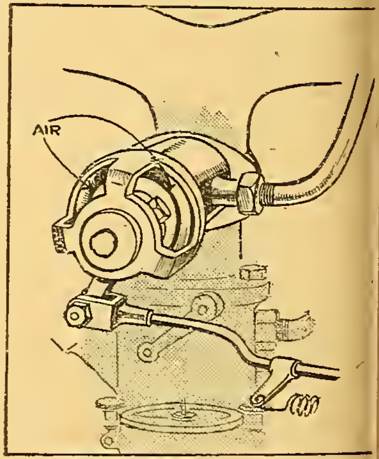
They are fortunate enough in having in stock quite a number of cylinders weighing 47 lb. each. Now, two of these would weigh 94 lb., which is a good deal lighter weight than is often transported on the rear carrier of a motor cycle, and there are few of the fair ladies one used to see riding on carriers before the war who were so slight as to weigh as little as a couple of these cylinders, which tends to show that the weight objection is not so serious as one would have been led to believe, though, of course, the total weight of the machine would be considerably increased. Probably if the weight of the reducing valve is also added to that of the two cylinders the total would be equivalent to that of an eight-stone passenger, which experience has demonstrated is not too much for the average medium-powered motor bicycle.

These cylinders are made to stand a pressure of 3,500 lb. to the square inch, which is equivalent to 235 atmospheres. Now a pressure of 125 atmospheres means the cylinder would contain 60 cubic feet; 150 atmospheres, 75 cubic feet; and 180 atmospheres 90 cubic feet. Consequently two cylinders would hold the equivalent of about threequarters of a gallon of petrol, while it is pointed out that if a sidecar were used four cylinders could be carried, which would have a total capacity of 360 cubic feet.

These cylinders are made of very light steel, and are highly suitable for the purpose, and, though the actual fitting of them to a motor bicycle has not ye been carried out, Mr. Flugel seems to think the idea is quite possible, and our artist has made a sketch showing the disposition of these and of the reducing valve—an ingenious device which reduces the norma pressure in the cylinders to atmospheric pressure, a which it is found that the gas is best introduced into the engine.

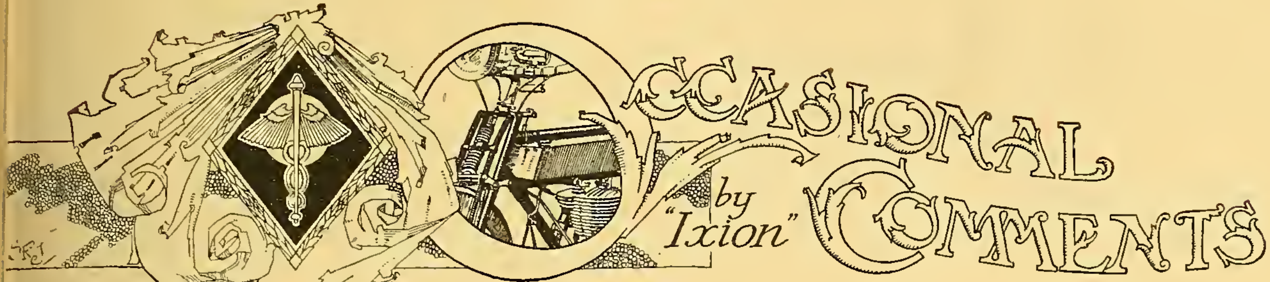
The Reducing Valve.

The reducing valve is an automatic non-return valve, which reduces the pressure by cutting off the supply as soon as a certain pressure in its chambe is reached. The gas is controlled at the entrance to the reducing valve, and again further adjustment i provided at the outlet. When the engine is once started it is a rare occurrence that either of the contro valves have to be touched, the control of the engine being carried out by a special mixing chamber which Mr. Flugel has introduced. This is a very nea device designed to clip on to the inlet pipe, and i so arranged that it in no way interferes with the working of the petrol carburetter. It consists of two valves working one in conjunction with the other, a gas valve which admits more or less gas, and an air valve which at the same time admits more or less air in the correct proportions.



Flugel gas carburetter for motor cycle engine. It may be used either with a pressure cylinder or gas bag.

When Mr. Flugel has actually fitted up a motor bicycle we shall be very much interested to hear how it behaves, and will communicate our observations to ou readers. We think that for sidecar combinations, a any rate, the installation would be a success.



OCCASIONAL COMMENTS

by "Ixion"

Extravagant Aero Engines.

SURELY "Cadet" is a little off the lines in asserting that aircraft engines are extravagant in fuel and oil, though he certainly errs in excellent company, as this fallacy is extremely prevalent nowadays. Its origin is quite obvious. Road motorists are accustomed to cover anything from 150 to 300 miles on a small tank of petrol: and the war has shown them that aeroplanes fitted with stupendous tanks have an "air duration" of no more than three hours in the case of scout machines. But have these jumpers-at-conclusions ever figured out the respective consumptions of road and air engines in relation to the power developed?

"Per B.H.P. Hour."

THE above cross-heading will mean nothing to some of our readers, but it is clear that if you are told Smith's "200 h.p." engine consumes fifteen gallons of fuel per hour, and Jones's "150 h.p." model consumes eleven gallons, you cannot work out their respective economy factors without a little mental arithmetic, especially as the "200 h.p." may actually develop no more than, say, 188 b.h.p., while the so-called "150 h.p." may give 167 b.h.p. at normal revs. Consequently, in the Services, for the purpose of comparing fuel and oil economy, the actual consumption per hour is taken, and divided by the b.h.p. at normal revs.: the result is the consumption "per b.h.p. hour," and gives a useful basis for comparison. Thus, a motor cycle engine, developing 3 h.p. at 20 m.p.h., and running at 80 m.p.g. (petrol) and 400 m.p.g. (oil), has a fuel consumption of .66 pint per b.h.p. hour, and an oil consumption of .13 pint per b.h.p. hour.

The Respective Consumptions.

THERE are, unfortunately, no standard petrol and oil consumptions for motor cycle engines. In an aeroplane the oil consumption is outside the pilot's control, and the strafe falls on the mechanics if the engine consumes too much oil. The fuel consumption, on the other hand, is more or less the pilot's responsibility, and if he handles his levers so badly that his 'bus does not register the correct economy, he either gets ticked off on his return, or empty tanks prevent his returning at all. In either case, the average consumption of fuel and oil by each engine is definitely known. I quote some approximate figures. A certain aero engine, of a type stigmatised as extravagant by "Cadet," has the following b.h.p. hour consumption figures: petrol, .54 pint; oil, .016 pint. Compared with my estimates for a motor cycle engine in the last paragraph (.66 pint petrol, and .13 pint oil), these figures are the precise reverse of extravagant.

Economy Indispensable.

A MOMENT'S thought reminds us that aircraft engines must inevitably touch the limits of economy. The designer wants a high power-to-weight ratio above all things, either in order that his machine may carry huge weights of bombs and fuel for long raids, or in order that it may outpace the enemy's fighters. The cutting down of the weight of an aeroplane to the minimum is wasted labour if unnecessary fuel and oil have to be carried.

The Contrast Pressed Home.

I DON'T want to lay any very close or heavy stress on the above b.h.p. hour comparisons, because nobody knows what the correct figures for motor cycle engines are. You buy a 3½ h.p. motor cycle, and until you have tried it out you do not know whether it will do 70 m.p.g. or 110 m.p.g. My last 2¾ h.p. did 42 m.p.g. as delivered, and over 80 m.p.g. when I had tuned it. Similarly, it is impossible to dogmatise about oil consumption, which varies between riders, between different makes of engine of the same c.c., and between sister engines of the same size and make. But it is broadly true that the carburation and lubrication of motor cycles are so crude that almost any aero engine can show better b.h.p. hour figures in both respects. This is the more astonishing when we reflect that the aero engine consumptions are registered on practically continuous full throttle work (or as nearly so as no matter), and that a motor cycle engine does most of its work on an average throttle opening of about one-third.

Extending the Comparison.

THE 10 h.p. light car, in which many of our readers are interested, perhaps affords a better basis for a comparison. Broadly speaking, the standard light car develops 10 h.p. at 20 m.p.h., and in an hour's run at legal limit uses half a gallon of petrol and a fortieth of a gallon of oil. If we based statistics on a hundred such cars in private ownerships, the consumptions would be greater and the power output less: but the above figures will serve our turn, and are in favour of the car. In other words, the b.h.p.-hour figures for a good light car in good tune are in the neighbourhood of .4 pint of petrol and .02 pint of oil. Compared with the aero engine, the petrol figures are good; but the oil figures are far worse than even the crude, oil-flinging rotary would register. Allowing for the comparatively easy duty on which the light car engine obtains its consumption, we must admit that no standard road engines can cast stones at the aircraft engines in the matter of consumption: and the many loose talkers on this subject must eat their words.

VALVE SYSTEMS ON FOUR-STROKE ENGINES.

Some Considerations of the Most Usual Types.

IN considering the types of valve systems which have been tried on motor cycle engines, one naturally considers the "mushroom" or poppet valve first. This is familiar to both old and new readers. It is practically universal on four-stroke motor cycle engines (shown in fig. 1). The reasons for this are—

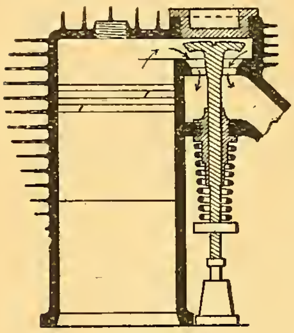


Fig. 1.—Ordinary poppet valve.

(1.) Its lightness and the fact that cylinder weight is reduced to a minimum.

(2.) It can readily be kept compression-tight.

(3.) It needs no special lubrication arrangements.

A valve system for a motor cycle engine practically stands or falls by its ability to comply with these three desiderata. Another point, however, may be mentioned, viz., the amount of work necessary for the mechanical operation of the valve. This, of course, must be kept as low as possible, but there is no example of a system which has complied with the conditions above mentioned and yet been abandoned because of difficulty of operation.

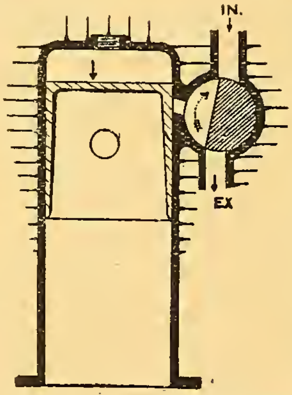


Fig. 3.—Rotary valve; commencement of suction stroke. The single valve operates both inlet and exhaust and runs at half crankshaft speed.

It will be interesting to consider the work which has to be done in operating an ordinary poppet valve, the exhaust valve only being taken into account for the moment.

Just before the exhaust valve lifts there is a pressure in the cylinder of, say, 30 to 40 lb. per square inch. This pressure, in addition to that of the valve spring, is holding the valve on its seat. Taking

Pressure gases ... = 35 lb.,
Area of valve ... = 1½ sq. in.,
Resistance of spring = 17 lb.,

then the cam operating the valve has to overcome an initial resistance of $(35 \times 1\frac{1}{2}) + 17 = 69\frac{1}{2}$ lb. This resistance drops immediately on the valve lifting; nevertheless, the considerable initial force required is often responsible for wear of the cam face. To overcome this, careful design of valve-lifting arrangement is necessary.

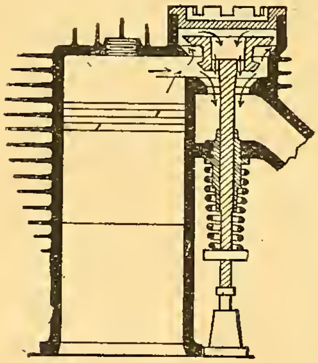


Fig. 2.—Double-seat or equilibrium valve. Lift of valve exaggerated to show action.

A method of reducing the initial force required to lift the valve is the use of a double-seat valve, a diagram of the operation of which is shown in fig. 2. By making the valve with two faces, as illustrated, the pressure of the gases in the cylinder can be practically neglected, there being as great a pressure trying to open the valve as to close it. In actual practice double-seat valves are generally made with the upper face larger than the lower in order that the valve may be lowered through the top opening on to both seats. The fact that the upper face is slightly larger will have a tendency to balance some of the resistance of the spring. This will give a very easy opening and yet retain the full strength of the spring for closing the valve.

The double-seat valve system gives better cooling, a freer exhaust, and less work done in operating the valve. It is, however, somewhat heavier than the ordinary valve. Also there is the difficulty of making the two faces compression-tight simultaneously.

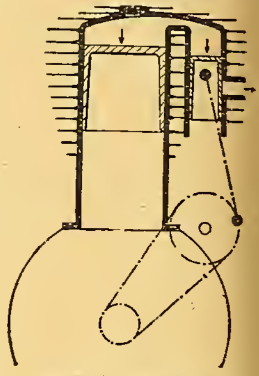


Fig. 4.—Piston valve: one valve for inlet and one for exhaust.

Sketch No. 3 shows a rotary valve arranged to operate both inlet and exhaust. This system at first sight would appear to offer great attractions. The valve can be made hollow and light, and the cylinder weight kept very low—perhaps lower than with poppet valves. Unfortunately, it is very difficult in practice to keep a valve of this description compression-tight, especially with an air-cooled engine. Also at low speeds, at any rate, this type is not as economical as the poppet valve engine.

With regard to the piston valve (fig. 4), this means a heavier cylinder and also difficulties in lubrication. There is something to be said for a small piston valve exhaust in combination with a central exhaust through the cylinder walls. In this case the piston valve would simply open for the purpose of allowing the cylinder to be properly scavenged. It would deal only with a small proportion (and this not the hottest) of the exhaust gases.

A system making use of the piston valve is the suggested Tilston four-stroke engine illustrated in *The Motor Cycle* of August 30th, 1917.

Sleeve Valve Engines.—The type of valve operation as in

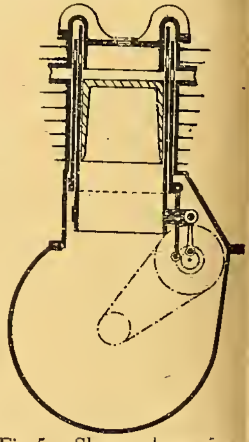


Fig. 5.—Sleeve valve engine.

lve Systems on Four-stroke Engines.—

g. 5 (but with water-cooled engine) has been satis-ctorily employed for some years. It is, of course, e Knight design used by the Daimler motor car akers. In the sketch, piston rings have not been iown. Rings are fitted between piston and inner eeve and between inner sleeve and cylinder head, ius ensuring a minimum of leakage. The sleeve valve igine can be made equally as flexible and efficient as e best poppet valve engine, and it is, of course, much ore silent in operation. Weight and cooling con-derations probably account for its non-appearance on motor cycles, but it may be added that a sleeve valve air-cooled engine was some years ago tested by the makers of a well-known sleeve valve car engine, and emerged from the most searching trials quite honourably. Yet, for some unknown reason, the type never developed, but it is probable that further experiments would render it practical—the present difficulty being, of course, the oiling of the sleeves in a way to ensure long life. These sleeves must be a reasonably close fit, and difficulty exists in retaining a sufficient film of oil under the high temperatures.

ENGRO.

A Triple-wheel Motor Cycle in Palestine.

How Two Douglas Riders solved the Problems of Sidecarring in Loose Desert Sand.

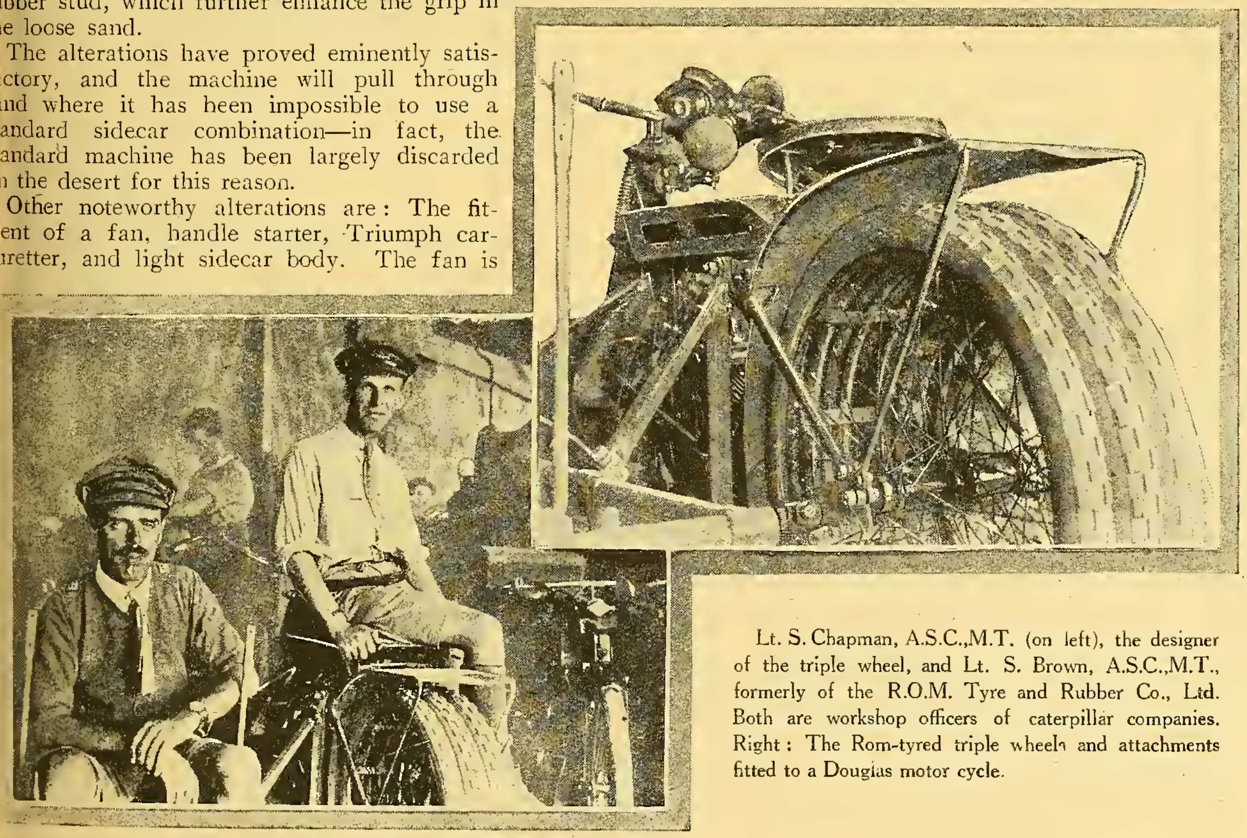
THE difficulties in using sidecar combinations on the sand at the Eastern Front will be readily appreciated, and a standard Douglas machine is been considerably altered so as to overcome these fficulties by two ingenious M.T. officers stationed in land of sand. The main difficulty encountered in ding in loose sand is, of course, the tendency of the ick wheel to bury itself, and so fail to get any driv-g grip. The two officers considered that widening e wheel would lessen this tendency, and so carried ieir theory into practice.

Briefly, two standard wheels are joined together by ie cone in the centre and a special spindle fitted. he centre rim and tyre (without spokes) is fixed the outside rims by struts, which make the whole heel as one—the back forks and stays being tered to suit. The tyres fitted are Rom special ibber stud, which further enhance the grip in e loose sand.

The alterations have proved eminently satis-ctory, and the machine will pull through und where it has been impossible to use a andard sidecar combination—in fact, the andard machine has been largely discarded the desert for this reason.

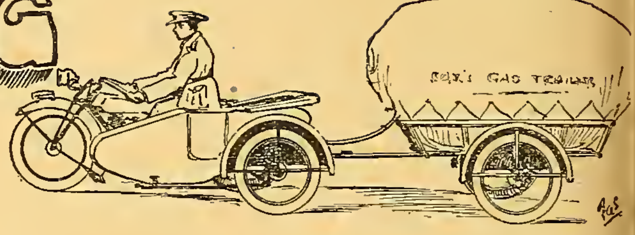
Other noteworthy alterations are: The fit-ent of a fan, handle starter, Triumph car-iretter, and light sidecar body. The fan is driven off the flywheel, and is most essential, having regard to the normally high temperatures in this climate. The foot starter as fitted by the makers is often out of action, for if the back wheel is at all buried, it cannot be used. The hand starter overcomes this difficulty, and, further, makes the engine easier to pull over. As regards the carburetter, the ingress of sand and dust is very troublesome, so a Triumph carburetter specially fitted up is used.

It may be as well to mention that Rom tyres are conspicuous on the Eastern Front on motor cycles as well as cars, one notable example of the latter being on the Armoured Car Section. This will be of interest, no doubt, to the Rom Company's trade in the Colonies, where tyres have to withstand tropical conditions.



Lt. S. Chapman, A.S.C.,M.T. (on left), the designer of the triple wheel, and Lt. S. Brown, A.S.C.,M.T., formerly of the R.O.M. Tyre and Rubber Co., Ltd. Both are workshop officers of caterpillar companies. Right: The Rom-tyred triple wheels and attachments fitted to a Douglas motor cycle.

BALLOONING

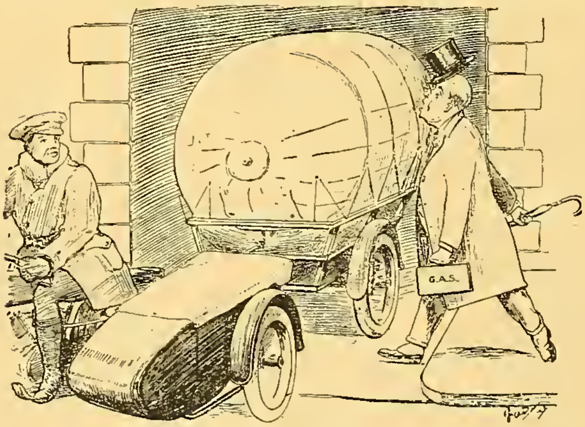


TRUE INCIDENTS—THOUGH SLIGHTLY INFLATED—DURING EXPERIENCES WITH A GAS TRAILER.

NOTHING on earth would have induced me to consent to the conspicuous task of towing a gas trailer had it not been that I could obtain my gas supply gratis from the office main. This being so, the trailer was duly installed, and amidst the jubilant cheers of street urchins I sallied forth with the balloon in tow.

All went well till I met the milkman on his evening round. The milkman's horse is one of the low-compression side by side valve variety, of Category C3, but on sighting that balloon it instantly converted itself into one of the copper-bottomed Class A fighting brand. Its first act was instantaneously and promptly to sit down in the centre of the road, ears erected, eyes bulging, bringing up the rear with a metallic clatter of empty milk cans.

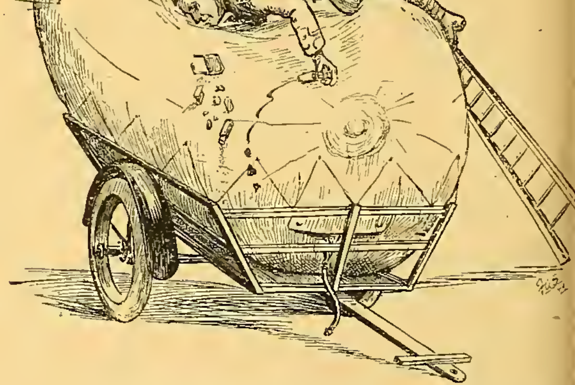
No one was more surprised than the milkman. Had his steed dropped dead and rolled back downwards with legs aspiring stiffly skywards, he would have taken it as more or less within the normal order of things, and proceeded to become used to it; now his surprise was one of paralytic helplessness. Next the horse stood straight on end, still staring with its ears, and proceeded to walk round on its hind legs in a narrow circle, till it faced in the opposite direction, whereupon the whole shoot literally slithered into a farmyard. When next day I asked the milkman if any damage was done, he replied, "Not much, sir. Only trapped his tail a bit when he sat down so sudden!" The same old horse passes me to-day with only a snort of contempt.



"Then proceeded to walk slick into the trailer."

A Collision in the Dark.

One recent dark night I emerged with the outfit from a side passage which leads into a main thoroughfare, holding up a pedestrian who was in the act of crossing the pavement at the passage head. Th pedestrian was of the prosperous commercial travell type, and, knowing that the trailer in the gloo behind was invisible, I shouted in passing, "Trail behind," to which he replied, "Same to you"- evidently thinking I was wishing him a merry Chri mas. Then having duly seen the sidecar pass, proceeded to walk slick into the trailer, his attitu being that of a man who treads on the teeth of hay rake, and is reminded of his error by the spee erection of the shaft. When last I saw him he w striking matches and groping about the pavement.



"The beastly ladder slipped, and I fell on top of the bally balloon."

On the following day we had a slight argument w a railway dray that we met in a narrow passage. T drayman shouted that all was clear, but, unfortunate he took only the trailer wheels into account, omitti to notice that the superstructure overhung somewh The result was that a corner of the trailer rail collid with a box poised perilously on the edge of the dr and from the crash that followed we judged that box was full of jam jars.

Examining the trailer on reaching home, I w surprised to find a pair of gold spectacles hook up in the gasbag, while just below was a narr jagged hole! Will the owner of the spectacles ple apply—though I would inform him that he has, spite of a warning, and probably with malice afo thought, bitten a hole clean through my gasbag! (these anti-motorists!

Somewhat Inflated.

There was once a man who made a bassinette [think our contributor means a 'cello, but has beco

ARIEL

"I am more than pleased with the machine. I am delighted. The easy-starting decompressor is a revelation."

A. B., ULVERSTON.

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In answering this advertisement it is desirable to mention "The Motor Cycle."

Write for Latest Price List.

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M.C. 509

Originality of Design

speaks in every line of the A.J.S., and because of what this betokens for superior service, prospective after-war buyers are everywhere increasingly deciding in its favour.

Correctly embodying every point essential for supremely-easy control, unfailing power, all-weather protection and perfect reliability — the A.J.S. forcibly evidences the richest results of thought, experience, and mechanical ingenuity. Its many original design-features include:

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Note a few details and prices of Model D: 6 h.p. Twin, 750 c.c., 3.speed, **£84** Coachbuilt Sidecar to suit, **£18 : 18.** Prices subject to 7½% advance. Hood, Windscreen, and Spare Wheel extra.

"Ask the man who owns one"—then enrol on our "Waiting List."

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THE USE OF THIS BADGE

is an indication that this Firm has been accepted as genuinely British by a Tribunal of Trade Competitors.

AJS
"Ask the man who owns one"

Ballooning.—

confused with bassoon.—ED.], and having completed his task discovered that he had left the glue pot inside. The following incident reminds me of that man.

We had left the trailer in a warehouse to fill slowly from the main, surrounded by large piles of crates and such like dunnage. Returning forty minutes later we were surprised to find the place in darkness, nor did manipulation of the switch cast any light upon the mystery. After careful search we eventually discovered the electric light bulb securely jammed between the fully inflated balloon and the side of a crate. Having set this matter right, we next attempted to extract the trailer, but only to find that, in its fully inflated condition, it could not be withdrawn from the building. It looked, at first, as though we should have to pull down an arch that propped up the three storeys above, but the warehouseman, being a gentleman of resource, suggested that we connect the balloon to the pipe again, then all sit on it to squash some of the gas back into the main. While we were discussing this sociable little scheme, however, the bag proceeded to flatten itself of its own free will, by breathing noxious odours through its pores, in that little way it has, and at the end of ten minutes, by means of judicious coaxing, prodding, and pushing with a plank, used as a shoe horn, we got it out of the place.

"We heard a sort of dull 'whoff.'"

But the gasbag met a sad end. One recent frosty morning my brother's son and heir espied a sparrow perched on top of it, shot at it with his air gun, and drilled two neat little holes clean through the top of the balloon fully a yard from the sparrow. I borrowed a ladder from the vicar, and got busy with a tyre repair outfit, but the beastly patches would not stick. It was like hammering a tack into a blancmange, and when I became irritable and tried to lean on the patches, the beastly ladder slipped, and I fell on top of the bally balloon. This burst it in another place, with the result that it was leaking worse than ever when that evening cook went into the outhouse with a candle to look for a carrot. We heard a sort of dull "whoff," the house shook slightly, and the housemaid, who was finishing up the bottled peas in the kitchen, cut her mouth. Then she ran into the sitting room where Arabella and I were reading.

"O! Mum," she gasped, "Cook's gone!"

The kitten shot up the curtain and growled.

"Where?" I queried, a shade incredulously.

The girl pointed dramatically to the skies. As she did so something fell with a soft thud on the gravel path without. I peered through the window—it was one of cook's felt slippers! We looked at each other doubtfully, then Arabella and I fell on each other's necks and shed copious tears. "The end of the gasbag!" we gasped hysterically.

H.M.B.

Something fell on the gravel.

LUBRICATION.

"CHINOOK'S" recent article on lubrication proves that satisfactory lubrication depends as much on the brains of the driver as on any mechanical or hand pump lubrication system. And so it does with all engines, petrol-driven or otherwise. In saying this, I must assume that the driver selects the oil and is responsible for the necessary lubricator adjustments. Any ordinary intelligence can ascertain with practice on a motor cycle how much oil his engine needs under all the conditions to which it is subjected; and he can easily feed it satisfactorily with a hand pump type of lubricator.

If he always has the Right Oil.

But every ordinary motor cyclist cannot be expected to understand the chemical composition of oils, and it is the engine designer's or producer's duty to specify the oil required. Practically all gas engine makers specify the oil that should be used in the cylinders of their engines.

I do not suggest that motor cycle designers should sell oil, but they are the men who should know best what their particular engines require, and they should at least specify the flash point, the specific gravity and viscosity. With these three points correct it would be impossible, as "Chinook" says, to get the oil in one's engine to a "viscosity akin to paraffin," no matter how overheated. The "drying up," as referred to by "Chinook," is by no means due to overheated oil, but to overheated and distorted metal due to over-driving. As proof, stand a minute with a draught of air on the cylinder, and you can restart in less time than it takes for oil to cool.

It is a common error to speak of the oil in the crank case as having a cooling effect in the sense of lowering the heat caused by the explosions. The only way worth taking into account in which heat is reduced by the oil is in its reduction of friction. If larger sumps and fins on crank case would reduce explosion-generated heat it would thereby enable a lighter oil to be used and so reduce friction, and to that extent be a good thing. But it seems of more importance to improve the cooling of the cylinder head where the heat is generated.

B. ROBINSON.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

THE A.A. AND THE UNITED COUNCIL.

The Secretary of the Automobile Association gives Reasons for Non-support.

We have several times recently dealt with the new United Council of Motoring Organisations, and we have expressed it as our opinion that such a United Council would be a good thing, and one that should receive the whole-hearted support of all motorists. There has, however, as we have already hinted, been a slight obstacle to the successful establishment of this Council, because one of our most wealthy and prominent existing organisations has refused to throw in its lot with its contemporaries. This body is the Automobile Association and Motor Union, and we are very pleased to be able to publish the following apologia from the A.A. as to its attitude on the matter, and as to its reasons for standing out. Comment on our part at the present time, perhaps, would be rather premature, so we prefer to hold over our own opinions on the matter, but in the meantime we shall be very pleased to hear those of our readers. The announcement reads as follows:

"On the 16th October last, the A.A. was invited to form part of a suggested United Council of Motor Users, Producers, and Distributers. An official copy of the minutes of a meeting convened by Mr. E. Manville and Mr. E. Powell, and held on that date, accompanied the invitation, to which, as secretary, I replied to the following effect, viz.:

> "'The committee are in entire sympathy with the suggestion of united action by all bodies concerned on matters pertaining to the production, distribution, and use of motor vehicles which may be affected by legislative or other proposals. They consider, however, that these questions can best be dealt with at conferences of the bodies concerned, to be held from time to time as occasion may arise.
>
> "'This Association was formed for the benefit of motorists and motoring generally, and to this end the committee feel that they cannot pledge themselves to support the policy of any trade body or bodies whose interests may conceivably clash with those of the private motorist; in the protection of those interests the committee prefer to remain entirely free.'

"The Automobile Association and Motor Union came into being to protect the reasonable from the unreasonable, and the measure of its development evidences the strength of that protection.

"The A.A. welcomes the co-operation of kindred bodies wherever and whenever the interests of the reasonable motorist are concerned. It is because the committee do not think that the proposed new Council can operate in the best interests of reasonable motorists that they have declined to support the scheme.

"Furthermore, the committee refuse absolutely to be fettered by enlistment in a combine, especially one whose constitution is based upon principles such as those disclosed in Paragraph III. of the resolutions unanimously adopted at the first meeting. That paragraph, part of an official copy of minutes already referred to, reads as follow:

> "'III. In respect of legislation, kindred matters and technical questions in relation thereto, to use its influence to discourage any organisation represented upon the Council from acting in a manner calculated to impede the policy or to injure the interests of any other organisation so represented, and to encourage united action and mutual support between all these organisations.'

"I invite careful attention to this paragraph—particularly to that part which aims to 'discourage any organisation represented on the Council from acting in a manner calculated to impede the policy or to injure the interests of,' *not* the general good of motoring, but '*any other organisation so represented.*' Without questioning the sincerity of those who drafted this significant clause, there must be considered with the clause the list of constituent bodies whose respective representatives unanimously passed the clause, and who, doubtless, will form the suggested Council:

> "Royal Automobile Club.
> "Roads Improvement Association.
> "Auto Cycle Union.
> "Royal Scottish Automobile Club.
> "Cycle and Motor Cycle Manufacturers' and Traders' Union.
> "Institution of Automobile Engineers.
> "Commercial Motor Users' Association.
> "Motor Trade Association.
> "Commercial Vehicle Manufacturing Interests in the Society of Motor Manufacturers and Traders and the Association of British Motor and Allied Manufacturers.

"Can it be possibly argued, except in a minute percentage of cases, that the interests of those bodies can be other than conflicting?

"Take the all-important matter of good roads. Who wants good roads? The motor user.

"Who pays most for them? The motor user.

"What does the greatest damage to roads? Heavy motor traffic and steam tractors, the users of which do not pay for them.

"Are the interests of Motor Users, members of the A.A., to be prejudiced because the hands of its executive are tied, as they would be, by a majority vote of the suggested Council to 'discourage action calculated to impede the policy or injure the interests' *not* of the general body of motoring, but 'of any other organisation represented on' that Council.

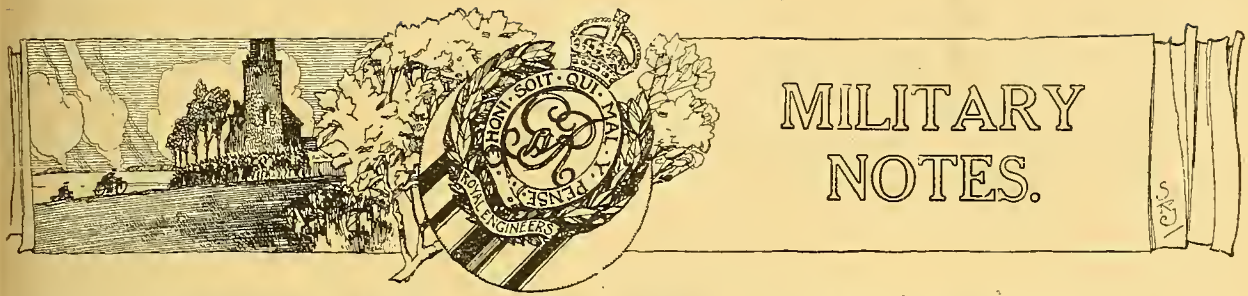
"Take the matter of motor fuel. Is it not the fact that the already exorbitant price of petrol has been advanced by the enforcement (upon all members of one of the bodies constituting the proposed Council) of a compulsory and excessive profit of 15% on the retail price of motor spirit? Compare this with the A.A.'s attitude when, several years since, it acquiesced in the middleman's 3d. per gallon as a reasonable working profit.

"Are the petrol monopolists likely to sympathise with motor users on these vitally-important matters? Is it 'business' for them to do so?

"The A.A. as trustee of the *user* is bound to regard Clause III., prescribing discouragement and restraint, etc., with far graver misgiving than evidently did the gentlemen who drafted it.

"They may *think* it is all right, but in deciding resolutely not to be allied with any trade body or bodies whose interests may clash with those of the motor user, my committee know that they are correctly interpreting the wishes of our members and of all reasonable motorists.

"Stenson Cooke, Secretary,
"The Automobile Association and Motor Union."


HONI SOIT QUI MAL Y PENSE
ROYAL ENGINEERS

MILITARY NOTES.

The Imperial Air Force and its Uniform: Ariel Rider's Distinction.

ARMY AND NAVY PAY.

OR the year ending March pay for the Army will amount to £112,000,000, and for the Navy £13,000,000.

* * *

ST. GEORGE'S DAY.

T has been decided to leave to the discretion of the commanding officers the wearing of the rose by all ranks the English regiments on St. George's ay.

* * *

AMERICAN COMPETITION RIDER'S NEW ROLE.

MANY competition riders will recall the name of Russell R. Coes, who made himself exceedingly popular, ad gained a reputation in reliability and ill-climbing competitions in this country 1914 on an Indian motor cycle.

Mr. Coes has just received a commis- on as second-lieutenant in the Ordnance epartment, United States Army. His

Russell R. Coes, who gained reputation in reliability and hill-climbing competitions in this country in 1914 on an Indian motor cycle. He has just received acommission in the U.S.A. Army.

tensive knowledge of motor cycles will ndoubtedly render him of great service the American Government. He ex- ects to be over in France some time uring April.

* * *

ORD ROTHERMERE'S SLEEPLESS NIGHTS.

HE fusion of the R.F.C. and the R.N.A.S. is causing many knotty problems. For instance, it is re- orted that Lord Rothermere, the Air inister, is spending many sleepless ights in trying to decide whether to ave a naval or military form of salute r the Imperial Air Force.

NAVAL OR MILITARY BOOTS.

THEN both officers and men are anxious to know whether naval or military pattern boots will be adopted. The former, it will not be necessary to inform many readers, have Derby tops and no toe caps.

Though khaki is the colour decided upon for the period of the war, it is hardly likely that R.N.A.S. men at sea will change over from the blue. Incidentally, it may be mentioned that there are many more R.N.A.S. ratings and officers on board ships than is generally supposed.

The light blue uniform, which may be worn by officers for evenings, has already made its appearance in one district at least.

* * *

1913 B.S.A. HANDBOOK.

STAFF-SGT. D. GORDON, Staff-Sergeants' Mess, School of Musketry, Strensall, Yorks., will be glad if any reader will let him have a copy of the 1913 B.S.A. Handbook.

* * *

PROMOTION.

WE note with pleasure that Temp. Lt. S. A. Rowlandson, A.S.C., has been promoted Acting Capt. Capt. Rowlandson was the skilful pilot of a Rudge motor bicycle before the war, and represented the Manufacturers' Union at the inspection of the last Auto Cycle Union Six Days Trials course. He is an exceedingly popular man, and is known not only for his prowess on a motor cycle, but for his remarkable skill in entertaining, as he is a talented musician and an excellent *raconteur*.

* * *

A MAN OF MANY DECORATIONS.

BESIDES a charge of unlawfully wearing the uniform of an Army lieutenant, Leon Beavis, a Canadian sergeant, was accused at Bow Street Police Court, London, of using the following military decorations to which he was not entitled: The Victoria Cross, Distinguished Conduct Medal, the two South African medals, Mons Star, and ribbon of the French Legion of Honour. According to the police, accused had been posing as a wounded officer, and had in his possession some wooden splints, which he occasionally wore on his left leg to lend support to his story that he had lost the use of his limb. He also wore a shade over his eyes, saying, "That's what the war has cost me." Sentence of six months' hard labour was passed.

TWICE-WOUNDED MEN AND HOME SERVICE.

MR. MACPHERSON announced in the House of Commons that it had been decided that men who had served abroad since the beginning of the war, and who had been wounded two or more times, were to be transferred to home service. Instructions to this effect would shortly be issued.

* * *

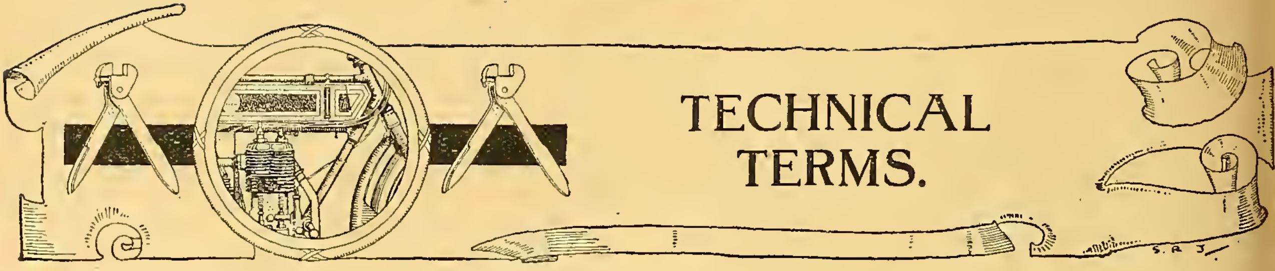
ARIEL MOTOR CYCLE EXPONENT WINS THE MILITARY MEDAL.

ANOTHER motor cyclist to win the Military Medal is Pte. Wilfred Morris, formerly a member of the staff of Messrs. Ariel Works, Ltd.

The Military Medal was conferred upon Pte. Morris for bringing in a motor lorry from the first and second line trenches during important military operations on the British front in France after previous attempts had proved unsuccessful.

Pte. Wilfred Morris.

He joined the forces in 1915, being previously engaged in assisting the Ariel Co.'s Scottish representative in his motor cycle business, and was an enthusiastic competition rider, who won many gold medals in 1914.



TECHNICAL TERMS.

SOME REMARKS ON VARIOUS TERMS USED, AND OFTEN WRONGLY USED, BY MOTOR CYCLISTS.

The meaning of certain technical terms is far from being always correctly understood, and the following series of articles by "Rama" is intended to elucidate in simple language their individual meaning. It is assumed throughout the series that the reader is acquainted with the working of the motor cycle. Discussion on any interpretation of these terms which may be at variance with the usual ideas of our readers will be welcomed.

THEY made up just such a crowd as, at the present time, even more than normally, is the motorists' main delight. Denied the open road we can do little more than talk of the times that have been and that are to be, and discuss those present developments that we hope will make the times to be even more enjoyable than those that have been. Some half-dozen other men—an R.E. Signals and a couple of R.F.C. officers in company with the works managers of a carburetter and a motor cycle firm—were so chatting, and from a relation of experiences the conversation turned to a discussion on more or less technical terms.

What really set the ball rolling was a remark by the Sapper: "I remember a ''bus' I owned in 1913 was a most extraordinary affair. Its compression was perfect, but its fuel consumption was enormous and 'speed' was Dutch to it. I always thought that good compression meant high speed and all the other ideals a motor cycle should possess."

"As a matter of fact," said Works Manager No. 1, "I think you are perhaps confusing good compression and a high compression—a very frequent error.

When the Sapper confessed that his ideas were a bit hazy on the subject the Works Manager enlightened him, and the conversation then ran on along similar lines. I shall simply attempt to reproduce a few of the definitions and theories put forward without attempting to chain them down to their original sponsors.

Compression Ratio.

For instance, this question of compression and "compression ratio" contains the germs of many a fruitful discussion. To give us some sort of a definite basis on which to work, let us take it as read that the petrol engine is an engine from which work is obtained by the conversion of the heat provided by the fuel into energy given out at the crankshaft.

Thermal Efficiency.

The value of a fuel is indeed measured by the number of heat units that it contains, the most commonly used unit being the British thermal unit—written B.Th.U. One B.Th.U. is the amount of heat required to raise 1 lb. of water from 59° to 60° F. (at sea level), and petrol contains about 20,000 B.Th.U. per lb., so that 1 lb. of petrol should be able to raise 20,000 lb. water from 59° to 60° F., provided none of the units was lost in the process—as a matter of fact, a feat impossible of achievement.

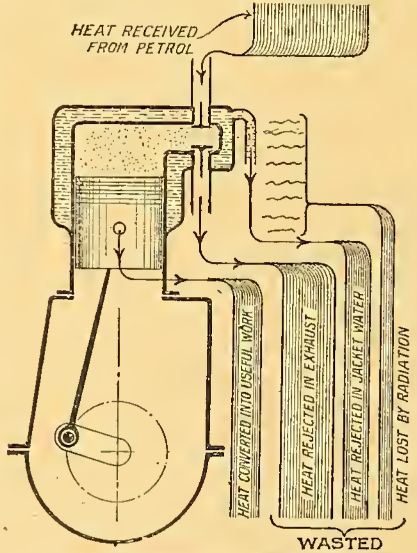

HEAT RECEIVED FROM PETROL
HEAT CONVERTED INTO USEFUL WORK
HEAT REJECTED IN EXHAUST
HEAT REJECTED IN JACKET WATER
HEAT LOST BY RADIATION
WASTED

Diagram illustrating the term, "Thermal efficiency." The width of the stream is in each case proportional to the amount of heat it represents, and it will be seen that the amount converted into useful work is only small compared with the amount supplied to the engine. Although this diagram represents a water-cooled engine, it is essentially correct for an air-cooled engine also, the heat rejected in jacket water being added to that lost by radiation.

Now these heat units have a mechanical equivalent—that is to say, they may be converted into work, and approximately 42 B.Th.U. should give out 1 h.p. for the space of a minute if there is no waste in the conversion.

The ratio of the heat in the fuel to that actually obtained as power at the crankshaft is known as the brake thermal efficiency of the engine. In other words, this may be expressed:

$$\frac{\text{Power given out}}{\text{Heat given in}} = \text{Brake thermal efficiency.}$$

If we feed fuel containing 42 B.Th.U. into an engine and ge from that engine 1 h.p. for a minute, the engine would be said to have a "brake thermal efficiency" of 100%, because the transference from heat or thermal to mechanica value has taken place without any loss. In practice the highest therma efficiency ever attained is abou 35%, so that two-thirds of the energy contained in the fuel i *wasted!*

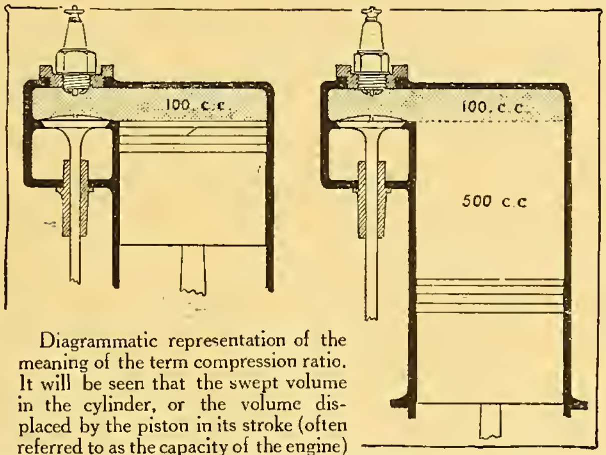
Having formed a clear idea as to the meaning of thermal efficiency we may return to a discussion o

Technical Terms.—

Compression: What it Is, and What it Does.

Before being exploded, the gas is compressed in the cylinder. Now if the cylinder allows of any leakage, either through a badly-fitting piston, faulty valves, or leakage round the caps, etc., when the explosion occurs some of its energy finds an outlet through these leaks, and consequently the whole force of the explosion is not exerted on the piston. Under these circumstances an engine is said to have poor compression, and it may in many cases be "turned over compression" by hand with little difficulty. On the other hand, if no such leaks are present the compression is good, and the whole force of the explosion is exerted on the piston.

There is, however, an entirely different aspect of the case that now needs consideration. Take two engines of the same capacity (say 500 c.c.) and with equally good compression—*i.e.*, with perfectly fitting rings and valves and no other sources of leak. Because the engines are of the same "capacity," it does not follow that the spaces above the pistons when these are at "top dead centre" are the same, and we will suppose that in one case the space is 100 c.c., while in the other it is 125 c.c. At the end of every exhaust stroke this space will be filled with gas remaining at atmospheric pressure (approximately).



Diagrammatic representation of the meaning of the term compression ratio. It will be seen that the swept volume in the cylinder, or the volume displaced by the piston in its stroke (often referred to as the capacity of the engine) is 500 c.c., while the combustion space is 100 c.c. Thus 600 c.c. is the total volume in the cylinder when the piston is at the bottom of its stroke, and when the piston is at the top of its stroke this volume is reduced to 100 c.c. The compression ratio of this engine would thus be described as six to one.

Now both engines on suction stroke take in (theoretically) 500 c.c. of mixture. This 500 c.c. has added to it in one case 100 c.c. of remaining gas, and in the other 125 c.c.; consequently in one engine 600 c.c. of gas is compressed into a space of 100 c.c., while in the other 625 c.c. is compressed into a space of 125 c.c. In other words, in the first case it is compressed to within one-sixth of its original volume, while in the other it is compressed to within one-fifth.

Compression Ratio.

These two fractions are known as the "compression ratio" of the engine, that of the first being expressed as six to one and that of the second as five to one.

An engine with a high compression ratio is colloquially spoken of as a high compression engine—any ratio above about 4½ to 1 being conventionally regarded as "high."

From this it will be seen that the fact that an engine has a low compression ratio does not necessarily signify that it may be turned easily over compression, for in many touring engines the compression ratio is low to ensure cool running and steady pulling at low speeds, but the compression itself needs to be just as free from leaks as in the case of a high compression engine. Although a low compression ratio does not necessarily mean that an engine may be turned easily over compression, it is generally the case that an engine with a *high* compression ratio is *difficult* to swing. A little thought should make the reason clear.

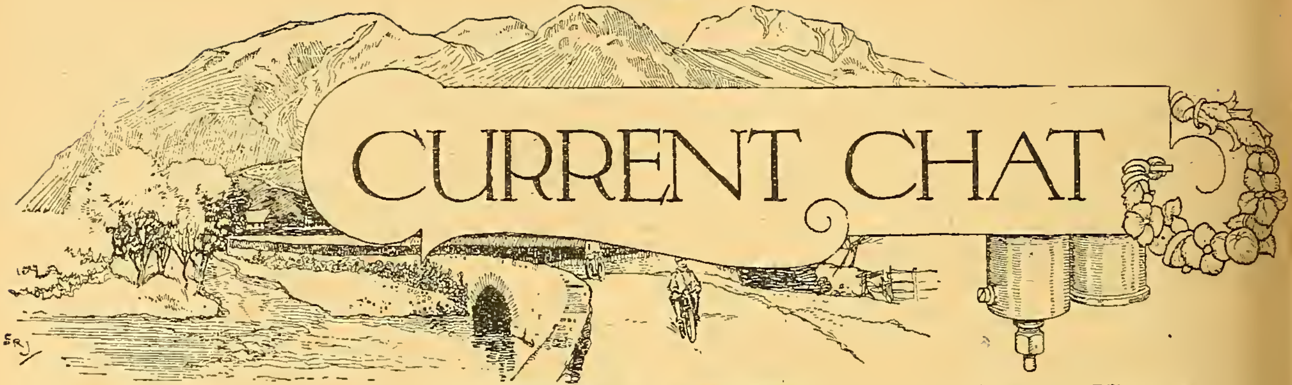
The Effect of a High Compression Ratio.

Now the greater the extent to which the charge is compressed, the more powerful is the ensuing explosion, and consequently the higher the compression ratio in an engine the more power will be obtained from the explosion—in other words, the greater its thermal efficiency. Unfortunately, however, the compression ratio cannot be indefinitely raised, and so thermal efficiency indefinitely increased, because compressing a gas also heats it, and if a petrol vapour and air mixture be *rapidly* compressed to within less than about one-sixth of its normal volume, it explodes spontaneously—as was described in an article on "Spontaneous Ignition" in *The Motor Cycle* on December 13th last. Consequently, compression ratio cannot be indefinitely raised, and the following extract from a recent book on "Aero Engines," by G. A. Burls, concisely expresses another argument against unrestrained raising of the compression ratio:

"Though increased thermal efficiency should accompany increased compression, it is often found with actual engines that increasing the compression results in little or no increase of efficiency, and indeed the thermal efficiency may even show a *diminution* with increased compression. This is due to a source of loss of which the above theory takes no cognisance, namely, the large loss of heat to the walls of the combustion chamber and piston crown at and near the maximum explosion temperature. This loss is greater as the surface exposed is greater relatively to the volume of hot gases enclosed; when compression is increased by diminishing this volume the ratio of surface to volume, and hence the heat loss, increases. This increase in any case must reduce any gain in thermal efficiency arising from the increased compression, and may even, as above remarked, more than nullify it. To realise the thermodynamic advantage of increased compression, this should be effected by increasing the stroke, leaving the combustion chamber unchanged in form and size.

"Due to this cooling loss, there is for each type of actual engine a compression ratio of maximum practical thermal efficiency, which is determined by experience; for petrol engines of normal four-stroke type the value is probably of the order of about 4.5."

All things change, however, and as a result of recent work on aeroplane engines compression ratios of well over 6 to 1 are now often employed. Three years ago this would have been actually impossible.



CURRENT CHAT

Times to Light Lamps.

GREENWICH TIME.

Mar.	7th	6.17 p.m.
,,	9th	6.21 ,,
,,	11th	6.25 ,,
,,	13th	6.28 ,,

Y.M.C.A. Hut.

Mr. William Douglas, of Messrs. Douglas Bros., Kingswood, has promised to defray the expenses of one Y.M.C.A. hut, at a cost of £750.

Driving Licences in France.

The increase in the application for driving licences in France has more than doubled since 1914. In that year 11,340 were granted, and in 1917 over 24,000.

Mails to Japan.

In a letter received from a reader in Japan, the writer says that not one copy of *The Motor Cycle* which has been mailed *viâ* America has failed to reach him since the outbreak of war.

Oil from Coal Waste.

Proposals for establishing a new British oil industry by the distillation of waste material from coal mines were made at a meeting of the Institution of Petroleum Technologists in London.

The South African Motor Cyclists' Corps.

We recently had some news of the work being performed by this corps in the rounding up of the straggling Huns in "German South East." The corps is now appealing in the South African papers for further recruits.

Work of the National Physical Laboratory.

Sir R. Glazebrook, the Director of the National Physical Laboratory at Bushey, states that during the period of the war they have tested half a million gauges for munitions. Nearly all the lighter alloys used in the production of our aircraft are the outcome of research at Bushey House. In the tank, which was 200ft. long, they had at one time forty or fifty models of warships, destroyers, and great merchant ships, and, following experiments, they were enabled to show how the requisite horse-power could be secured at a saving of 10%, and in some cases 15%, of fuel.

Aeroplane Models.

The National Physical Laboratory has a special department for ascertaining the effect of wind on aeroplanes. Models are placed in a space, and air forced in up to 60 m.p.h. The staff has been increased to 500, 200 of whom are women.

New Department of Overseas Trade.

We have already referred to the new Department of Overseas Trade, which has been set up under the joint administration of the Board of Trade and Foreign Office.

Duty of Attaches.

The duty of *attachés* of this new body—who will be recruited from the best members of the Consular Service—will be to collect information, and give a real economic survey of the countries where Overseas trade is to be fostered.

Traders' Risks.

Dr. Addison, Minister of Reconstruction, has appointed a "Committee on Financial Risks" to go into the question of traders' after-war risks. The belief that with the coming of peace there will be a fall in prices, involving a loss on materials bought at the present high level, is causing a reluctance on the part of manufacturers and traders to acquire materials for the resumption of peace time production on a full scale.

Americans in Paris.

A member of our staff who was recently in Paris expresses himself as very agreeably impressed by the many American soldiers he met there. Most of them proved on acquaintance to be very fine fellows, both physically and intellectually, and though for the most part fresh from school or college, there was little in their manner or appearance to convey any impression of extreme youth—big, serious fellows, fully realising the magnitude of what lay ahead.

Special Features.

THE FOUR-CYLINDER OF YESTERDAY AND TO-MORROW.

TECHNICAL TERMS. COMPRESSED GAS

South African Motor Track.

South Africa wants a Brooklands on the Rand, but at a recent meeting convened to consider the proposal support was very scanty, and the main asset—funds—appeared to be lacking.

Queer Name for a House.

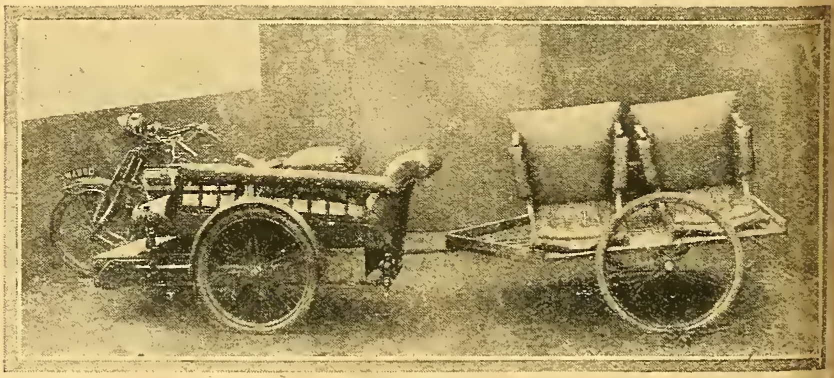
There is—or was—in Coventry a house named DU 1597, after what was, presumably, the number of the resident's car! (The actual number, by the way, we have of course, altered.)

Nerve-strained Soldiers.

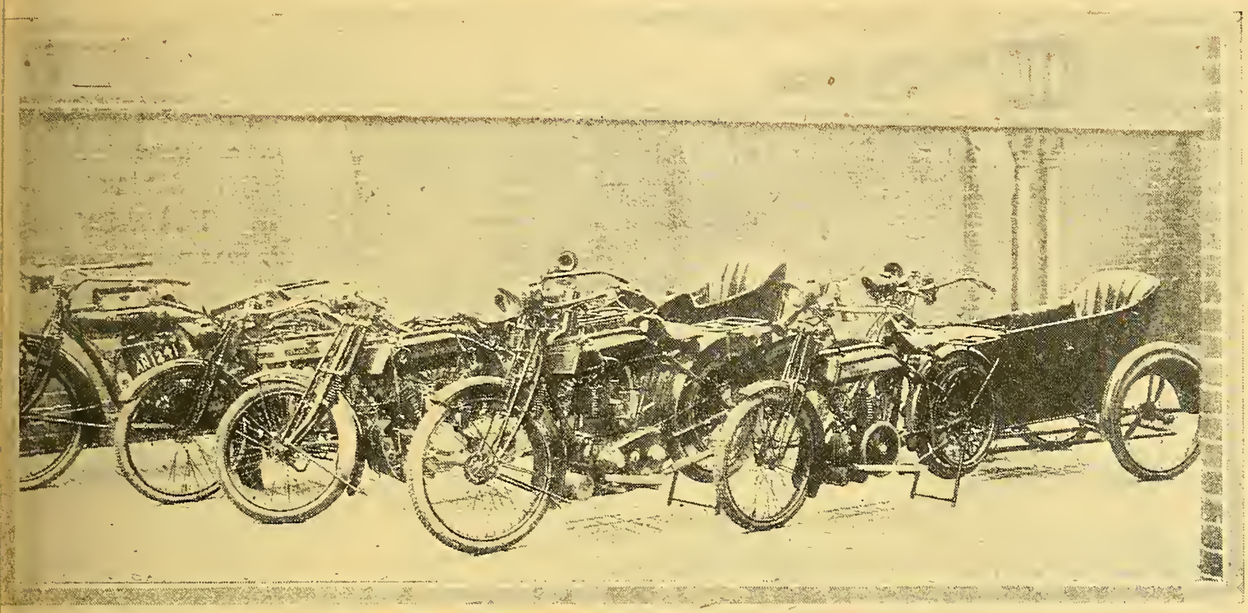
Mr. Macpherson states that eight institutions for the care of nerve-strained soldiers have been organised, and four are in course of establishment. Medical officers are being specially trained for the treatment of the patients.

War Photographs in Colour.

The first exhibition of British war photographs in colour was opened on Monday last at the Grafton Galleries London. It is a record of British operations on all fronts and in every phase of warfare. The wonderful photograph of the march through the blinding sands of an Egyptian desert is prominently hung. Soldiers who have recently been hanging the photographs have found among them pictures of themselves in battle.



An A.J.S. and sidecarrier used by Mr. Wilfred Barnes, furnisher, Sheffield. It is not often one finds the motor cycle put to the purpose of conveying suites of furniture, and the owner of the machine is to be congratulated on utilising his machine to such good purpose. "In these days there is an excuse for overloading, although the A.J.S. always takes the big loads without faltering," says Mr. Barnes.



WHOLESALE THIEVING OF MOTOR CYCLES.

A batch of stolen motor cycles outside the police garage at Ilford. All these stolen machines have been identified, their owners have been informed that they have been found, and the machines will be returned to them shortly. When the case was tried at the Old Bailey, the prisoner, Frank John Bennett, pleaded guilty, and was sentenced to four months' hard labour. In the course of the trial it transpired that he had deserted from the Army. He had also been the 9 st. 4 lb. boxing champion of England. Among the machines are a Sun Villiers, New Hudson, Abingdon, King Dick, Douglas, Indian and Enfield.

0 Fine for using Petrol.

F. W. Rumball, a New Cross motor clist, was fined £[illegible]0 at Greenwich last eek for using petrol on a motor cycle d for exceeding the speed limit. P.C. ollier, in evidence, said the defendant's atement that he was using the machine r travelling to work at an aircraft ctory was untrue.

oman Despatch Rider's Smash.

A W.A.A.C. motor cycle despatch der, attached to the A.S.C., M.T., staff epot at Grove Park, was rather badly jured by a collision with a motor lorry Bromley last week. She was taken to hospital suffering from injury to her ead. Part of the frame of the machine an overhauled W.D. Triumph—was roken by the impact.

he A.C.U. and the New United Council.

On another page of this issue we pubsh the explanation given by the A.A. its standing aloof from the new nited Council. At a meeting of the eneral Committee of the A.C.U., held n February 28th, it was decided that ne A.C.U. should follow the lead of the .A. The reason given was very similar that given by the A.A.

he Institution of Automobile Engineers.

The sixth ordinary general meeting of he Institution of Automobile Engineers ill be held at the Royal Society of Arts, ohn Street, Adelphi, W.C., on Wednesay, March 13th, at 8 p.m., when Mr. . L. Martineau will read a paper entitled "Nomography, with a Few References to its Use in Engine Design."

Cards of invitation to the meeting can e obtained on application to the secreary of the Institution of Automobile Engineers, 28, Victoria Street, S.W.1.

The Magneto Question.

Readers interested in this matter should read carefully our leader on the subject, and also the important letter from the Chairman of the British Ignition Apparatus Association published in our correspondence columns this week.

"The Autocar" Red Cross School at Vevey.

Lt. Michael A. J. Orde, R.F.C., son of Mr. Julian Orde, the secretary of the R.A.C., has now joined Lt. Wallis in the management of the latter's school of motoring. We have already referred to this school, and repeat our request that readers will help with subscriptions the excellent work being carried on.

Monitor in Place of a Tank.

At a meeting at Barrow to consider the raising of a quarter of a million pounds during Business Men's War Bond Week the Mayor stated that Messrs. Vickers have promised to build a model monitor to take the place of a Tank in raising the funds.

Death of Mr. Roland Marston.

We greatly regret to learn of the death of Mr. Roland Marston, who died suddenly a few days ago. Mr. Marston was only forty-five years of age, and was closely associated with the motor and aeroplane radiator department of Messrs. John Marston, Ltd., the manufacturers of the Sunbeam motor bicycle. He took a prominent part in the municipal life of the town of Wolverhampton, and in other public work. Owing to his energy and skilful management, the radiator department of Messrs. John Marston, Ltd., developed into an extensive business. He leaves a widow and one son, to whom we extend our deepest sympathy in their loss.

North-Eastern Automobile Association.

The report of the meeting of this Association for 1917 has just been published. Naturally there is little of real motoring interest contained in the report, but we are interested to note that the committee is giving its attention in all seriousness to the attention of fuels. This in itself is a good sign, as too much attention cannot be concentrated on this all-important subject.

The motor cycle section of this Association is now completely in abeyance.

Training of Discharged Soldiers.

This Association has also interested itself in the employment of discharged soldiers, and is appealing through the columns of its own journal for members who are willing to allow to discharged soldiers facilities for learning the business of chauffeuring in company with members' present drivers.

National War Funds.

The National Relief Fund (distributed £3,783,657)	£6,332,109 0 0
British Red Cross	9,169,627 13 2
Tobacco Fund	149,117 0 0

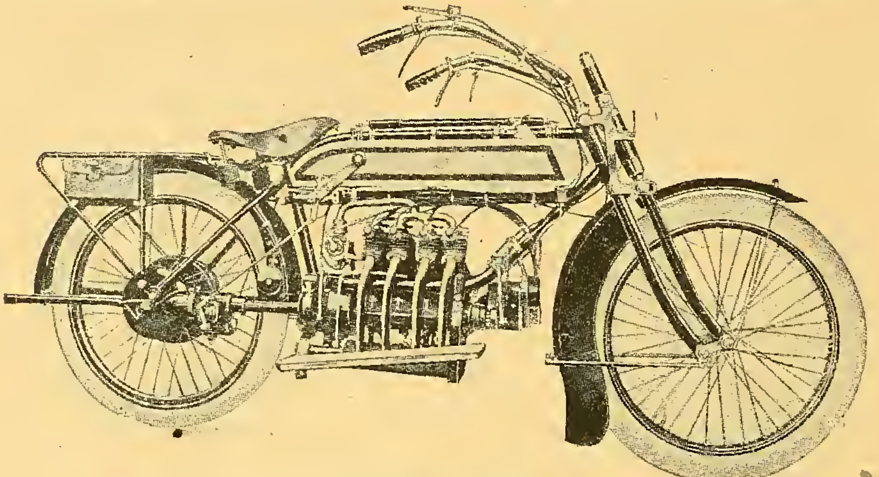
Motorists' Protection Association.

We are advised that Mr. Fred Haigh, 34, Castle Street, Liverpool, has been appointed honorary district secretary for the proposed organisation to be called the Motorists' Protection Association. Particulars of the suggested policy of this Association have already appeared in these columns, and we are informed that between 400 and 500 motorists have sent in their names as supporters. It is proposed to hold an inaugural meeting in London on March 14th. No definite subscription has yet been fixed, so that at present supporters do not bind themselves to become members later on.

The Four-cy
and

POSSIBILITIES AN
FOUR-CYLINDI

FOR some years past the writer has been foretelling both in the columns of this journal and to his sceptical motoring acquaintances the eventual triumph of the four-cylinder motor cycle over all other types on the road, therefore it may not come amiss to indicate wherein the "four" has failed in the past, and to throw out some suggestions as to the lines on which the modern "four" might well be produced. It may be advisable to mention that the opinions expressed herein are founded on a four-cylinder road experience dating from the earliest models, augmented by several years of close acquaintance with one of the few repair shops specialising in four-cylinder motor cycle overhauls.

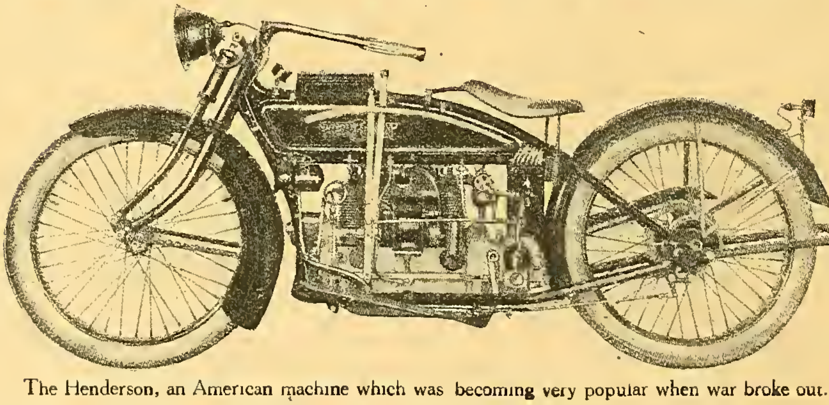


The latest model F.N., of 7-9 h.p., embodying many improvements on the old type, and spoken of highly for sidecar work.

In the past it has been left largely to the F.N. to fight the battle for the "four" in this country, and, whilst such machines as the T.M.C. and the Pierce have had their admirers, they departed to such an extent in their general construction from accepted principles of motor cycle design as to require but little notice in any practical consideration of the four-cylinder cycle *as a pure motor cycle*. By that it is intended to imply that hybrid vehicles, half-car and half-cycle, however great their merits, are unlikely to become serious rivals to present-day types, if only for the reason that the purchasing public are apt to be surprisingly suspicious of departures from conventional type, characterising as a "freak" that which their eyes are not accustomed to see in the hands of the multitude. To command the necessary market, it will be essential, therefore, to wean the public gradually to new ideas, and in such details as frames, tanks, and general layout to preserve, as far as possible, in the first British "fours" the semblance of the present-day standard single or twin.

The Engine.

The capacity of each cylinder in a motor cycle "four" must necessarily be extremely small, and the smaller the capacity of the cylinder the greater is the necessity for extreme efficiency. Following the well-advised practice of the light car world, the four-cylinder cycle power plant should be a high-efficiency engine that "revs," as any attempt at a slow-running power producer would be almost an impossible proposition in the limits of a motor cycle frame. A revving "four," with its even torque, permits of a higher compression ratio than is possible with a single or twin of the same total capacity, and high compression means greater efficiency from each small cylinder, improved total power output, and more miles per gallon. It has been the writer's experience that most of the troubles in the old F.N.



The Henderson, an American machine which was becoming very popular when war broke out.

machines had their origin in lo
pression—a peculiarly vital fail
case of an automatically-valve
Automatic valves, of course,
taboo on a modern "four."
tunately, high compression and
do not go hand in hand, and,
sphere of the "four" will in
be that of the sidecar machine,
sidered that the addition of wa
will not detract from the desi
the outfit, and will make pos
advances in efficiency as to c
for the additional weight and
tion. A recent contributor to t
contends that the old F.N. is
"beating any single or twin f
power." The writer's experi
not support that statement, th
of all air-cooled four-cylinders b
tendency to overheat on a long
varied country. The 5-6 h.p.
L-headed cylinders with autom
valves; the 7-9 h.p. model has
cylinders with mechanical v
opposite sides. The latter desig

The Pierce. This revolutionar

tates a long stroke, if high co
is to be used without plug tro
in a long stroke engine of ul
capacity it is difficult in pr
retain good compression, and
reason the writer advocates a cy
approximately "square" dimen
high compression cylinder of
type with ordinary side-by-si
usually involves its owner in an
bill for valve replacements, owi
incandescent conditions unde
these essential adjuncts are con
work. For this reason overhe
are a *sine quâ non*, and, inde
two years fairly continuous
three different makes of overhe
twins, the writer is left wonde
the *practical* objection to this

# of Yesterday
rrow.

ES OF POST-WAR
LE PRACTICE.

lly is. The one weakness of
compression, square-dimensioned
lies in its plug-eating capacity.
that would have seemed an in-
difficulty, but aeroplane de-
ve occasioned wonderful strides
nition world, and peace condi-
introduce the public to super-
lugs to suit any type of engine.
ng system need not be elaborate,
"fours" run best well warmed.
umsy radiator, therefore, would
ble disadvantage, though pump
might be worth considering.

Ignition.

ajority of motor cyclists will
the first time in the "four" a
ce of trouble—the distributer.
urers seem in the past to have
he principle that what is good
r the car is good enough for the
l have cheerfully perched on an
racket, open to dust and rain,
of mechanism sheltered in the
he car under the bonnet. It is

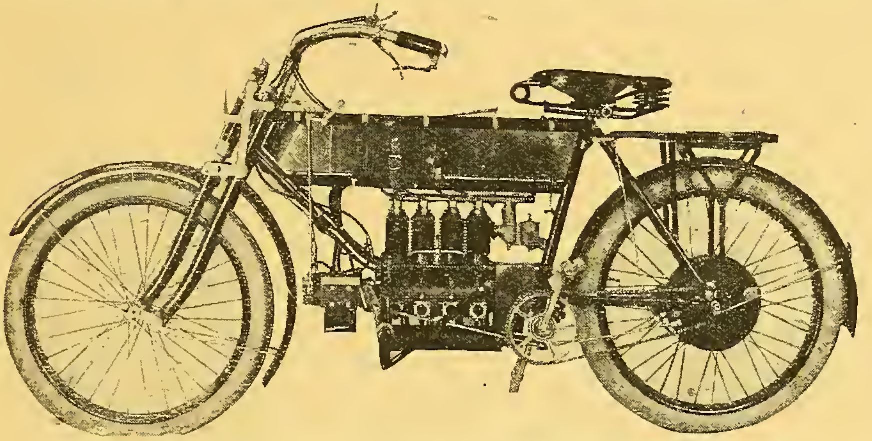
a. Petrol and oil were carried

engineering, too, to be compelled
a distributer in such a position
dependent on the proper func-
f a vacuum pipe to prevent the
r from being smothered in oil
crank case. It is vital in the
"four" that the magneto and
r be completely enclosed in a
case designed in harmony with
f the unit. A proper fibre tube
provided for the leads to the
d those who have realised the
mmunicated to the handle-bars
rider's wet waterproof happens
gainst the plug terminals on a
y will appreciate the insistence
inor point—that the machine
sold with insulated plug ter-
standard.

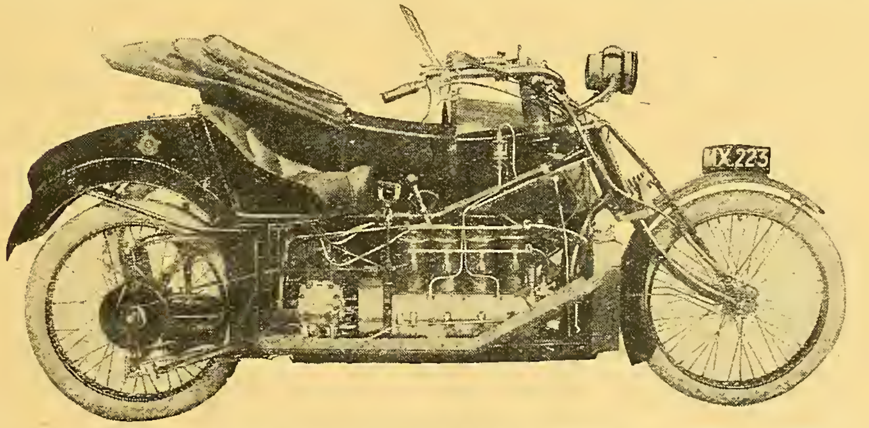
The advent of the tiny "four" will direct attention to the deficiencies of present-day motor cycle induction systems. What will function well enough in the carburetter line on a big single or a twin is hopeless in a little "four," where each cylinder must receive its correct proportion of properly atomised fuel constantly and regularly. The writer has seldom come across a four-cylinder motor cycle that, immediately on being started up from cold, would fire regularly on all four cylinders without hunting or missing. He has heard this fault attributed to sticking automatic valves, dirty distributers, sooted plugs, choked filters, etc., but very seldom has the root cause been mentioned—an improperly designed induction system. Little insistence seems to have been made by the motor cycle press upon the importance of pipe area and streamline contour in induction system design. Designers of earlier four-cylinder motor cycle engines were content to run a straight pipe over the cylinder heads, with four stub pipes *of the same diameter* branching off to the cylinders *at dead right angles to the main pipe*. That one ever got regular firing at all on these models was due to the volatile character of the spirit in use in those days, but present-day petrol finds the obstacle race to the cylinders too much for it, and it is common to see riders of old models warming up at appalling "revs" on the stand before venturing on the open road. Then came the day of graceful curves and globular swellings—all very artistic, but rarely arranged in conformity with any apparent recognition of the law of motion, so far as the mixture is concerned.

It has puzzled many riders of recent model "fours" to know why the two end cylinders get hotter and keep cleaner than the central two, and instances have been known in which mechanics, attributing this peculiarity to unequal lubrication, have gone to the trouble of fitting separate oil leads direct from the oil tank to the end compartments of the crank case. It has rarely occurred to riders that the two end cylinders are doing an undue proportion of the work, mainly because the induction system is so arranged as to feed the end cylinders at the expense of the other two.

In view of a discussion some time ago in these pages as to the merits or demerits of long and short induction pipes, it may interest readers to know that the writer, approaching this subject with an open mind and without any pretensions to higher training in engineering, found in practice that a main induction pipe on the long side gave the best



The Belgian 4½ h.p. F.N., a motor cycle that was popular in many countries as long ago as nine or ten years.



The T M C., the only British our-cylinder motor cycle that attained any degree of success.

The Four-cylinder of Yesterday and To-morrow.—

general results, but that the differences observed as the result of increasing or decreasing the length of the induction pipe became of very minor importance in relation to the problem of pipe-direction and the proportion of pipe-diameter of branch pipes to that of the main pipe.

For reasons too lengthy to be detailed here, the writer can see no future for the two-lever carburetter on a four-cylinder motor cycle. The single-lever automatic carburetter possesses certain advantages as regards a "four," which will make its use universal.

Scavenging.

No obstruction must be placed in the way of the rapid clearance of the burnt gases from the cylinders. What has been said about induction pipes applies with almost equal force to exhaust pipes. The 7-9 h.p. F.N. is an instance of a well-designed exhaust system, while its predecessor, the 5-6 h.p. model, secures extreme silence at the expense of an appreciable amount of back pressure. The effects of back pressure on a small "four" are of much greater importance than on a single or twin of similar capacity.

Transmission.

Judging by the correspondence columns, four cylinders and shaft drive are inseparable in the minds of the majority of riders, and one might even conclude that the main advantage of the four-cylinder power unit lies in the fact that it lends itself readily to shaft drive. In the hands of an expert driver, who does not place undue strains on any part of his combination, and to whom even a minor collision is a thing almost unknown, the shaft is perfection, but in the hands of the average man it is not likely to enhance the maker's reputation. It must be remembered that the back wheel of a heavy combination is subject to quite exceptional strains. It has to take the bulk of the weight, the twisting strain of the sidecar, and the driving effort, and it is housed in the best of machines in a somewhat flimsy fashion. Moreover, it must be readily detachable for tyre repairs. The superiority of the shaft is only apparent when the crown and bevel are exactly adjusted. Even an expert cannot fake a quiet adjustment when a machine has had a fair amount of careless handling, and the lining up of the shaft after an encounter with some heavy object is a job which the average motor cycle repairer likes to see taken to a rival garage. Most riders can tinker up a broken belt or chain by the roadside. Few would be able to do much to a troublesome shaft.

Apart altogether from the question of damage to the shaft, it is a harsh form of drive when the engine is in a sulky mood and given to erratic firing. The snag of a chain is unpleasant, but the knock of a shaft is akin to the conk of an overloaded single. Again, the replacing of the back wheel after a tyre change by the roadside—especially in wet weather or failing light, and tyres usually choose such conditions for a display of frightfulness—is a delicate operation, and the writer has unpleasant recollections of such incidents, where even the superlatively foolproof design of the 7-9 h.p. F.N. inspired a few epithets that would not have disgraced Capt. Kettle in his prime.

In short, therefore, since it should be the manufacturer's aim to construct the machine that will give least trouble in the hands of the average man, a chain drive of the Henderson type would appear to be the most suitable drive.

Lubrication.

If the British manufacturer finds the sump and pump system, as used on the 7-9 h.p. F.N., too costly to make, let him above all else avoid the drip feed almost universal on singles and twins to-day. The old-fashioned hand pump, if crude, was efficient. Drip feed on a four-cylinder is quite inefficient, unless arranged with an array of separate feed pipes, which are ugly, complicated, and none too dependable.

Frame.

The four-cylinder machine is usually of long wheelbase, and the tendency to side-play in the spring forks is, therefore, increased. A fork of great lateral rigidity is essential. A certain amount of resiliency in the fork might well be sacrificed to lateral rigidity. The writer may have a bee in his bonnet, but it is his opinion that future experiments in this direction would be better directed at stiffening the forks and springing the handle-bar. It has always been a source of surprise to him that the Enfield people did not continue with their spring handle-bar, which, with some mechanical restriction of its vertical motion, would have been beyond reproach.

American, Continental, and British Ideas.

One can say that the two best four-cylinder motor cycles on the pre-war market were the Belgian 7-9 h.p. F.N. and the American 10 h.p. Henderson. Each was typical of the country of its origin—the Belgian machine standing for grace in design, superlative finish of details, minimum weight, and maximum efficiency from medium cubic capacity, while the American subordinated beauty of outline and delicacy of detail to cubic capacity, speed, and that simplicity of operation which renders a machine proof against fools, but robs it of its individuality. Is it not possible for the British manufacturer to find the *via media?* We require somewhat more cubic capacity than the F.N. and somewhat less than the Henderson; something more robust than the Continental product, but less rugged than the American—in fact, we want a product of the British mind, which alone seems able to rise to the conception of beauty, strength, and efficiency in one comprehensive whole.

H. E. Thompson.

* * *

Another Method of Renovating a Tank.

During what promises to be a long vacation many motor cyclists will overhaul and renovate their mounts in anticipation of good times to come.

The following method of redecorating a tank can be strongly recommended for its simplicity, excellent effect, and ease of execution.

The lining, which is usually the great obstacle, is overcome by what I believe to be a novel means, and gives a result practically, if not equally, as good as the professional job.

The tank should first be thoroughly scraped and cleaned down with fairly coarse glass paper. Paper is first cut to the shape of the panels desired and stuck in place with gum or flour paste.

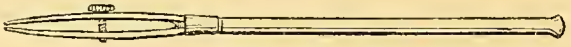
Using a good quality paint (not enamel) and a soft camel-hair brush, the top and sides are first painted.

When the surface is entirely covered remove the filler caps and support the tank by placing the fingers inside while the bottom is painted. Hang up to dry for forty-eight hours in a place free from dust. A second coat may then be applied. When this is dry remove the paper panels, and trim the edge of the paint with a penknife and a ruler. This should leave a sharp, straight edge.

Lay a piece of cardboard along the edge and, with a comparatively dry brush, carefully paint the panels the desired colour. A slightly ragged edge does not greatly matter, as this is afterwards covered with a line.

When dry a second coat is applied. Leave this to dry for three or four days, when the lining may be taken in hand.

For this a drawing pen is required somewhat similar to the one illustrated.



Drawing pen used for lining tank.

A little paint is put in an egg cup and thinned slightly with turpentine.

Adjust the points of the pen to about $\frac{1}{16}$in. apart by means of the screw.

Mark faintly with a pencil the desired line and then go over it slowly and firmly with the pen. The points should not be allowed to touch the ruler, but kept just clear.

The curves at the rear end of the sides and the small front panels are made by first cutting cardboard to the correct shape and using as the ruler. A smaller piece is placed underneath to lift it clear and obviate the risk of the paint running under the edge.

Any lettering should be outlined in pencil, followed by the pen and ruler. The letters are then filled in with a small brush or the side of the pen.

They can, when dry, be lined in colours with the pen. Leave the tank hanging up for about a week and then apply two thin coats of varnish. This should be applied evenly with a rag and cotton wool pad, and each coat thoroughly dried.

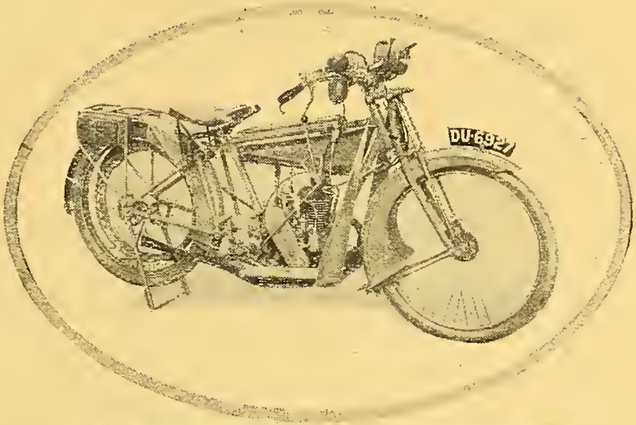
If reasonable care is exercised a smart and durable surface will be obtained ready for the days of plenty which we all hope are not far distant.

T. Thearle.

EXPERIENCES WITH LIGHTWEIGHTS.

SOME COMPARISONS AND OPINIONS.

A lightweight of 1901, the type of machine on which the author tasted his first experience of motor cycling.



A well-equipped lightweight of to-day—the rear sprung Allon two-stroke.

I HAVE always looked on the lightweight motor cycle as the ideal machine, particularly for the business man who requires a machine for the ordinary everyday round of commercial life, and as a ready means of gaining healthy recreation during the week-ends. When I look back and compare my first lightweight fitted with a 2½ h.p. Minerva engine with my present mount, a modern two-stroke machine, I can do nothing but wonder at the marvellous strides that have been made in bringing the lightweight to its present state of efficiency as a reliable go-anywhere machine.

How many miles I pushed that old relic of the past I should not like to speculate; the weird knack its accumulator possessed of transferring acid to my clothes, with anything but good results; the way the contact breaker had of sticking every mile or so, and in addition endeavouring to turn itself into a miniature crank case in the way it had of accumulating oil; the tiny belt, and narrow pulley that gave up business at the slightest sign of wet weather, and the automatic inlet valve, the chief function of which seemed to be to stick to its seating, and there remain: these were the ordinary affairs of life. Indeed, they were the days of the lightweight enthusiast! Many a Saturday afternoon have I wheeled the machine out of its stable for a run (most of the running, by the way, being done by me at the side of the machine), only to find that something was not "quite in order." If you were lucky the eventual result was a run of perhaps half a mile without mishap; if you were not, you never got beyond running the engine on the stand.

Resignation and Resuscitation.

I "carried on" with this 'bus for months, but came to the conclusion that as a ready means of speedy locomotion the lightweight motor cycle was not altogether "it." I gave it up, and it was not till the end of 1913 that the fascination returned, and I invested in a "Baby Levis." I shall never forget the delightful feeling of sitting across this little miniature and "paddling off" for the first time. I had one of the first of these machines in the district, and when there were some half dozen of us with them, we formed what was practically a "Levis" club, and no small excitement was caused in those days when we (including a lady) were on the road. The noise of half a dozen two-stroke engines on the move was decidedly a novelty, and the questions I have answered respecting the running, etc., of this class of engine would fill a book. I ran this machine for over 8,000 miles, the only expense for replacements being 1s. 6d. for a new inner cable operating the compression release valve. I had absolutely no trouble, although I treated the little bicycle in anything but a proper manner. I used to take a passenger (our combined weight being 21 stone) seventy-five miles practically every Sunday afternoon, and the way the little engine pulled was a marvel. I have run it to a standstill through overheating, but after fifteen minutes "rest" it was off again as fresh as ever. I could touch forty miles an hour solo, and thirty-five with a passenger. What a difference from the old Minerva days! I eventually sold this machine locally, and it is running about now as well as ever, its new owner having nothing but praise for it.

Experiences with the Petroil System.

Although perfectly satisfied with the little Levis, I was anxious to try a "Petroil" lubricated machine, and invested in one. This I found difficult to start unless the petrol was turned off about a hundred yards before the last stop, as any petrol left in the float chamber evaporated, leaving behind the oil, which on restarting generally choked the jet. The mixture also had a way of creeping all over the machine, leaving behind a dirty oily mess. The engine itself, however, ran really well, and had a splendid petrol consumption. What made me give it up was the way it wore out bearings, 2,000 miles being sufficient to make the main and big end bearings very bad, although the gudgeon pin brass did not suffer to any great extent. After rebushing it was just as bad when the same mileage had been covered, although more oil was used than recommended by the makers.

I next returned to my first love, and this time tried a 2¾ h.p. Modèle de Luxe fitted with two-speed countershaft gear. I found this machine an excellent

Experiences with Lightweights.—

"puller," but not much faster than the Baby. The extra power was most useful when taking a passenger—in fact, I could climb most of the hills in the Eastern Counties on top gear.

A Four-stroke Interlude.

Hearing a lot about the 2½ h.p. J.A.P. four-stroke engine, I sold out and bought a New Imperial J.A.P. with two-speed gear. This turned out to be a fine machine, very reliable, and much faster on the level than any of my previous mounts. After a bit of tuning I could nearly touch fifty, but, of course, could not keep it up. Another great point in its favour was a petrol consumption of 130 m.p.g. I had thousands of miles of reliable running out of this machine, and eventually sold it, since when I have owned and ridden some twenty makes of various lightweights, both two and four-strokes. Practically all were highly satisfactory, one in particular, an Allon two-stroke, being particularly good. This machine, with its original design, is certainly the outcome of much experimenting, the only thing I could find fault with being the front band brake, which was rather fierce when suddenly applied in an emergency.

Review.

From the experience I have gained with twenty-five or so machines, I have come to the conclusion that there is very little to choose between any of the first quality lightweights of the present day, and, further, the lightweight has come to stay. The only real trouble I had was with the first petroil lubricated engine, but on another machine I had fitted with the well known Villiers power unit, and lubricated by the same method, I had no trouble, the engine doing some six or seven thousand miles without rebushing, so that I can only attribute my trouble to bad design, and not to the system generally.

To the novice there need be no question of fear if he buys a machine turned out by a maker with a reputation. If you are an absolute beginner possibly a two-stroke would be better, as there are so few working parts in this type of engine, and decarbonising is simplicity itself. A two-stroke also has the advantage of being light on tyres, due to the more even running of the engine, while in favour of the four-stroke you have a better petrol consumption and more speed—the former no small advantage in these days.

A two-speed gear is very useful, and in some parts of the country absolutely necessary, but I hope to see in the near future a neat three-speed gear box incorporated in the really first-class lightweight. In my opinion, the difference in ratio between the gears of the present two-speed box as fitted in general is too great, and creates a tendency to "hang on" to the top speed in preference to changing down and letting the engine "rev" for dear life. Although I live in a fairly flat district, I frequently feel the need of a middle gear, which would be quite low enough for most traffic riding, and just right for the average hill. The bottom gear could then be used for starting and very bad hills.

The armies of both Britain and France are kept well posted with news. The photograph depicts a D.R. selling newspapers behind the line of the French Army. H. E. Plateau, who forwarded the photograph, says it is a great business with them (the D.R.'s). The paper being handed to the infantryman is *The Motor Cycle*, and the machine a B.S.A.

Some Sound Advice.

Most of the two-strokes I have had have been fitted with too large a jet to the carburetter. Some would only do about fifty miles to the gallon, and not two-stroke under twenty miles an hour on the level. A little care taken to find the correct jet, and a slight adjustment to the petrol level makes all the difference.

For two-strokes there is nothing to beat a good single-point plug with a stout central electrode. I have had multi-pointed plugs with thin electrodes burn completely away at the points when the engine was run at all hard for a few miles, and a great deal of apparent overheating is due to nothing but an unsuitable plug, the points of which become incandescent with consequent pre-ignition. Two-strokes are much more susceptible to plug trouble than are four-stroke machines, the reasons being, I think, fairly obvious, but any plug trouble can be readily and easily cured by changing the plug, and consequently is of only minor significance.

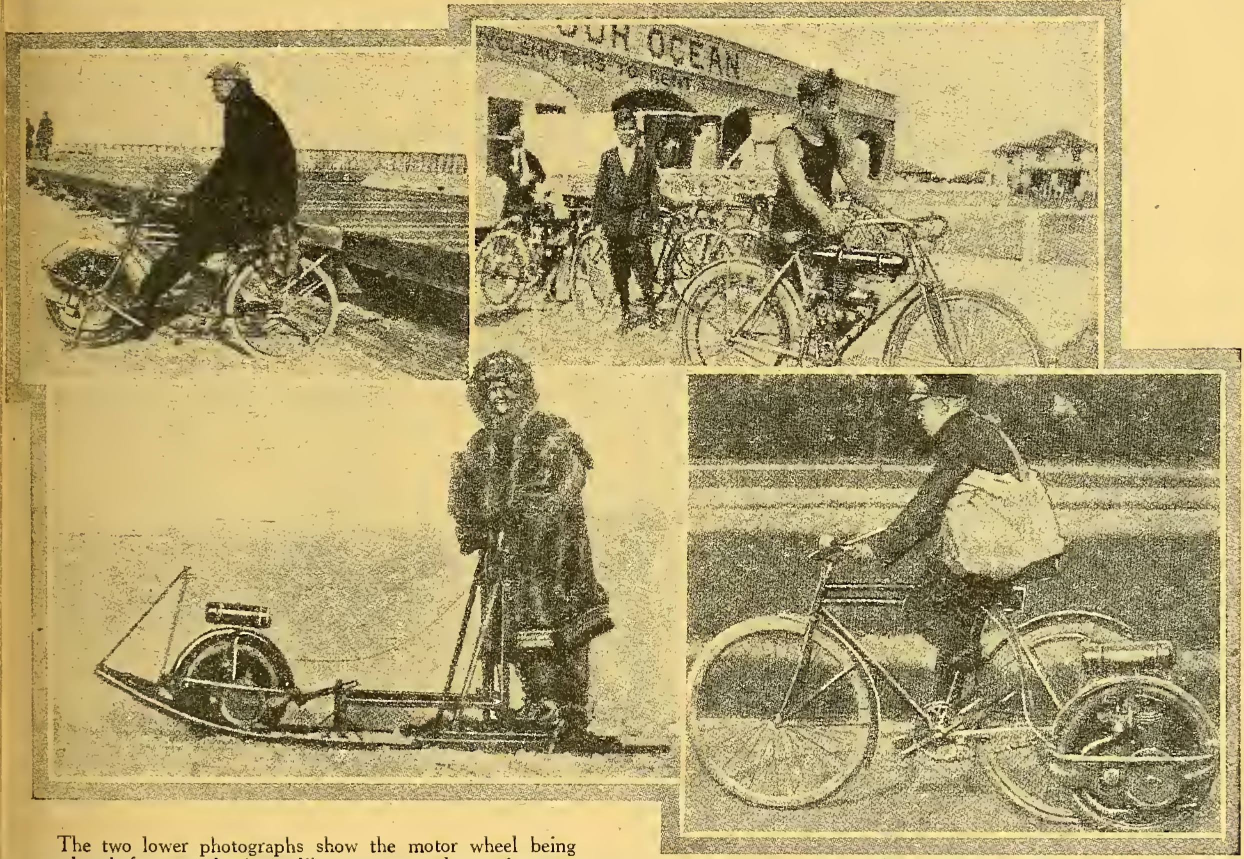
Always use a good brand of lubricating oil, it is much cheaper in the long run than rebushing, and do not forget that the cycle parts of the machine require regular attention. Treat your little machine with respect, remembering it has a big heart, and it will give you splendid service.

W.A.R.

THE MOTOR WHEEL.

Some Account of Light Motor Attachments for Pedal Cycles popular in the U.S.A.

THE motor wheel is becoming extremely popular in the United States. Imitation is the sincerest form of flattery, and it is gratifying to know that the first Auto-wheel was British, the successful Wall Auto-wheel having set the fashion. As we have previously mentioned in these pages, the American form of Auto-wheel is the Smith Motor Wheel, which is used in the same manner as the Auto-wheel. There is also a light four-wheeled vehicle on buckboard lines, driven by a Smith Motor Wheel at the rear and steered by an ordinary steering wheel.



The two lower photographs show the motor wheel being employed for very business like purposes, the arctic scene exemplifying its utility and adaptability to a very unusual degree. The upper photographs depict the Dayton power unit built into the front wheel, and the Cyclemotor, a small two-stroke design to fit the frame of a pedal cycle.
("*Motor Cycling and Bicycling*," *Chicago*.)

The Merkel motor wheel replaces the rear wheel of the standard bicycle and incorporates a self-contained spring suspension, which greatly adds to the comfort of the rider. The engine has overhead valves actuated by rocker arms and push-rods, and a long exhaust pipe.

The Cyclemotor.

The Cyclemotor has a compact two-stroke engine, and is designed to fit inside the diamond frame of a pedal cycle. The transmission is by belt, and a light belt rim is fastened to the spokes of the cycle. The petrol tank is carried under the top tube, and the complete unit is somewhat after the style of the attachment sold in this country by J. E. Smith, J.E.S. Motor Works, Gloucester.

The Dayton.

The Dayton is interesting in that in its form it somewhat resembles the early Singer motor bicycle of 1901 or thereabouts, inasmuch as the motor unit is built into the front wheel, though, of course, the Singer was very differently constructed. The Dayton has a refinement not usually found in these light attachments, namely, a multiple-disc clutch controlled by a twist grip from the handle-bar, which is naturally very useful in traffic. The amount of ingenuity displayed in the design of these light motor attachments, most of which do not exceed 20 lb. in weight, is quite surprising. There is no doubt that such attachments—few of which will propel a machine at a greater speed than twenty miles an hour, and will therefore not appeal to the enthusiastic motor cyclist—will do useful missionary work in educating cyclists up to the joys of the use of a properly designed motor bicycle.

We have already on various occasions pointed out that perhaps the most valuable service performed by the ultra-lightweight is that of securing recruits for the fully-fledged motor cycle.

LETTERS to the EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

A LUBRICATING TIP.

Sir,—I read with amazement that one of your readers had been mixing castor oil with engine oil. Perhaps by now he has found out that the two will not blend, and to do this is a patent process which is jealously guarded by those in the know.

He will doubtless find that he has an advantage in this so-called mixture, inasmuch as the castor oil being separate does the majority of the lubrication, while the other simply burns away. I would suggest he use pure castor if be can get it for nothing; the mixture only makes messes.

London, W.C. DAN.

BRITISH MAGNETOS.

Sir,—With reference to the interesting paper on "Motor Cycles," read by Mr. A. G. Pendrell, which appears in your issue of February 21st, we feel that we are entitled to take exception to his remarks regarding British magnetos. We have ourselves produced over 43,000 all-British magnetos since the outbreak of war, the bulk of which have been used by the British and Allied Governments, and we are prepared to prove that the mouldings we use are in every way equal to the German make.

We are sorry for the English firm who had to order tools, etc., for the 300 magnetos for motor cycles. We alone are producing 750 magnetos for single-cylinder engines per week, and shall be in a position to satisfy the demand for magnetos for motor cycles when the war is over, no matter how large that demand may be.

E.I.C. MAGNETOS, LTD
W. T Turner, Managing Director.

Sir,—The reference to British magnetos made in the paper read before the Coventry branch of the Institution of Automobile Engineers, and reported in your issue of February 21st, has been brought to our notice, and I have been asked to correct the misstatements made therein.

The author suggests :

1. That the insulating compound used for the mouldings is of inferior quality.
2. That the combined British output would scarcely supply Coventry alone.

The following are the facts :

1. The various British makes of insulating material have been submitted to the National Physical Laboratory, and the report on these has established that the material is equal, and in some instances superior, to the orignal German productions.
2. In September of last year a report on the actual number of magnetos produced in the various British factories during the preceding twelve months was asked for by a Government Department. This total was considerably more than the imports of Bosch magnetos for the twelve months preceding the war, as stated by the responsible official of the late Bosch Co. at a Government inquiry. That was six months ago. To-day the British output is at double that rate, and is still increasing. The concern of the British magneto manufacturers to-day is whether the motor trade at home will expand sufficiently after the war to absorb their outputs.

As regards the quality of British magnetos, the Government Departments to-day have ample powers to insist upon the high efficiency that is necessary. It is well known these powers are used to the full to obtain efficiency in everything appertaining to aero production.

We have been allowed to publish a few of the special performances of machines fitted with British magnetos, such as the record bombing flight to Constantinople and the destruction of the Zeppelins. But of more value in establishing the reputation of the British magneto of to-day is the fact that every day the lives of our airmen, and the very success of operations in the field, are dependent upon it.

I trust these facts will re-assure anyone who still has doubts on the ability of this country to produce its own magnetos after the war. PETER F. BENNETT,
Chairman, The British Ignition Apparatus Association.

PETROL SHORTAGE.

Sir,—Recently I visited London, expecting to see the streets rather bare of anything that used petrol. You can imagine my surprise when I found the streets full of taxis. The great majority were aimlessly wandering about looking for fares, and (would you believe it?) I saw several cars stop and discharge the occupants at a theatre. I saw three motor cyclists (military, of course). One can easily see with half an eye the aim of the authorities, to stop private motoring. Personally, I have no cause of complaint. I have a permit to buy petrol and use it. I work eleven and a quarter hours daily, and the ride of five miles each way to home energises and keeps me fit to stick unhealthy workshops, etc.

I think the present restrictions are crude, to say the least of them. Why not prohibit the use of petrol in taxis and suchlike when they *roam* about streets for hours on end looking for a chance fare? UNFIT.

Farnham.

Sir,—My idea in writing this letter is to impress on those people who think that the petrol shortage is faked, the vital importance of petrol to the aero engine manufacturer.

I hold a responsible official position in a department which looks after the production of aero engines, and am stationed at one of England's most famous manufacturer's works in the Midlands, so I really can state something of the truth about petrol.

There is something like 50,000 gallons used per month at this one factory alone for aero engine tests (endurance tests and ordinary bench tests).

This seems a great waste at first sight, but it is *absolutely necessary* to test each engine with *petrol* under actual flying conditions, which is done by means of the elaborate test beds which are used for the particular engine to which I refer.

We have not had a single instance of an aeroplane fitted with one of these engines coming down or being inconvenienced in any way with engine trouble, and the number turned out would make the Germans look sick if they knew.

Which would the perpetual grumblers prefer : petrol for their own use or petrol used to make the British aeroplane engine, the British aeroplane service, and the British airmen the finest in the world? It is something which does not require much thought, but simply answers itself.

We want petrol for dozens of such factories in this country *now*, and also for the very vitally essential transport traffic, both lorries and cars, serving the thousand and one needs of the industries, which are keeping the world going at the present moment, from this little country called England.

It is, of course, a pity that motor cyclists cannot obtain supplies of spirit, and I am as much "in the cart" as others, because I have been a constant rider since 1909, and own a big American twin at the present time, but, disagreeable as it is, I am obliged to leave my 'bus in Town, because I see very slender chances of obtaining a licence. JOHN G. GRENFELL.

AR RATIOS.

Sir,—In *The Motor Cycle* of January 24th I read a letter gned by "Triumph," and would very much like to know e writer, and how he managed to get the various engine rockets to give him the different gears mentioned.

I greatly desire to get about 4½ to I gearing, as I find e standard 5 to 1 is rather low for my work, and especially w that the finer weather is coming on. I might mention at I have ridden Triumphs since 1906, both as an owner d for the trade, so hope I know how to handle one. though great friends with several men in the trade, I ve so far been unsuccessful in obtaining a sprocket larger an 15 tooth.

F. A. CLARKE.

B.E.F.

BRICATION.

Sir.—"Chinook's" suggested design for crank case cooling February 21st would obviously aggravate the evil it is tended to relieve, because the interstices between the fins ould rapidly fill up with accumulated mud until the crank se resembled an inverted pre-historic mud hut! If the erage rider keeps his crank case in the average condition e all know so well, how is it to be expected he would uster the courage to tackle such a feat as "Chinook's" esign would periodically involve? Inside fins would almost eclude the possibility of thoroughly cleaning the crank se inside with any assurance that the "dregs" were enrely swilled out.

J.W.

Belfast.

Vhy not fit an underscreen?—Ed.]

ENTRIFUGAL FORCE.

Sir,—"Ixion's" query as to the possibility of flying rough interstellar space can be answered without reference a flying expert. There is no ponderable medium of any ind in the empyrean. The utmost limit of our atmosphere about fifty miles. At greater heights than this gravitation so much reduced that the molecular velocity of the molelles of oxygen and nitrogen carries them off, if the line flight is radial. The moon has no atmosphere at all on is account; it was not big enough to hold the air it took ith it when it bade farewell to the earth.

However, this point is immaterial, for long before the mits of the atmosphere were reached the body of the too enturesome pilot would burst, owing to the absence of the ery useful pressure of 15 lb. per square inch we enjoy own here.

I should like to take this opportunity of saying that Mathematician" and "Lieut., R.F.A.," are mistaken in aying that "centrifugal force" is merely a convenient 'fiction." If a weight be tied by a string to a peg and hirled in a circle the peg will be broken if the weight r the speed be too great. The force on the peg is centrifugal orce, and tends to make it move (Latin *fugio*, I flee from) way from its position. If the weight were circling round n the inside of a smooth sphere, the sphere would press n the weight with centripetal force (Latin *peto*, I seek). n fact, under Newton's "Third Law" centrifugal force s just as real as centripetal force and no more.

A. L. GRAY.

OODS MADE IN GERMANY!

Sir,—I have been watching with interest during the last ew weeks the discussion *re* goods made in Germany, and may ay I was absolutely astounded when I read Mr. Ives's and his ollowers' letters. I did not think for a moment that there were such people in England. I heartily agree with Messrs. Turnbull and Waddington, also "A New Zealander." I may add that if Mr. Ives and company are childish enough to stop taking your paper because of that I am afraid they are only "cutting their nose to spite their face" and that they will take *no* motor journals at all, because every motor paper I know has followed your lead Wishing you every success, etc.

M 6148.

Chester.

Sir,—The letters under this heading in your issue of February 7th tempt me to butt in with a remark or two. The necessity to escape the scathing satire of determined "haters," like Mr. Geo. P. Waddington and others, is my apology for commencing on a personal note. When war broke out I was incorporated in a regiment of the "contemptibles," with whom I fought from August, 1914, until June, 1916. I was discharged in consequence of injuries but soon after joined the M.T. as a motor cyclist. I had a long spell up country with them, and I am prepared, if my health ever permits, to rejoin the boys in the trenches until the end. And with it all I back C. S. Ives every time! Absolute security for the future is the only thing that can save this war from being an unredeemed tragedy, and *no peace can give us such security.* It can only be obtained by a course of policy after the war which will tend to draw the peoples of the world closer, and by substituting good feeling for bad and friendliness for hatred. It is useless to say that the Germans are beyond hope, for one's reason surely tells us that a nation of 70,000,000 must, *in the main*, consist of decent everyday folk, however much *their* "haters" and militarists may have misled them; and, in any event, we have to live all on the same globe, so why not try and make the best of them instead of perpetuating hatred? By all means must our "basic" industries be conserved in English hands, but, with that reservation alone, we must meet German trade by improving our methods and business science, and not by a reactionary "protection" policy, coupled with petty spite, tending only to irritate international life, instead of promoting that close union of all peoples in which lies our only hope. And so I, in common with an ever-increasing body of soldier opinion, regret such statements as yours, firstly, because they are false to our original ideals, and, secondly, because all such statements will hinder the establishment of that secure future which is so ardently desired by the war-weary nations of the earth. After all, we fought, and so many died, not for German trade, but rather for honour and security.

Mr. Waddington will do well to remember that those who disagree with him on this question are not thereby necessarily worms, and that such talk is needlessly offensive; it might even be that hardships, sufferings, and the oft near presence of death have given an added insight to their political view of life.

H. G. M. NEWTON.

B.E.F.

Sir,—It seems a great pity that your notice respecting "Goods made in Germany" should have appeared in *The Motor Cycle*. It raises a vexatious question. The arguments for and against are equally intelligent, save for the bitter personal attacks made by some of your readers who are least able to bring into play their faculty of reason. I appreciate sound criticism, and admire a candid critic, but to manifest so much bitterness and heap contempt upon a fellow-correspondent whose views run counter to our own is no virtue, and certainly unworthy of publication in *The Motor Cycle*. No other conclusion can be arrived at than that the spirit which gave birth to such impossible resolutions at the Paris Conference is responsible for the greatest tragedy in history. The European slaughterhouse is nothing of which to be proud, and this wave of national jealousy will disappear, as will your notice which has caused so much contention.

JAS. REECE.

Three motor cyclists attached to the Southern Command. They are all old riders. Their names, reading from left to right, are Sgt. Mayne, Cpls Swan and Jeffery.

FLYING FACTS AND THEORIES.

Sir,—I have read the articles on the above subject with much interest and intellectual profit, and now, for the first time, I find myself unable to agree with one of Mr. W. G. Aston's conclusions.

On page 200 the following sentence is to be found: "If the gust lasted indefinitely, that is to say, if the gust became a steady relative wind in the direction shown by the arrows in fig. 2, the machine would tend to fly level, *i.e.*, keeping its centre of gravity the same height from the ground (after its appropriate relative speed had automatically adjusted itself) in the attitude shown in fig. 3." Surely this will depend upon the speed of the wind relative to the earth's surface and the speed of the aeroplane through the air. When these speeds are equal the aeroplane will not move relative to the earth, and consequently will maintain its altitude, but if the air speed of the aeroplane is in excess of the wind velocity the aeroplane will descend; if the reverse obtains, it will rise tail first. Let us take an extreme case (often useful in mathematics), and suppose the wind to be vertically upwards and the nose of the aeroplane to be pointing to the ground. The results will then be obviously as I have stated, and the aeroplane will only retain its altitude when its air speed equals the wind velocity.

Please note that I am not suggesting that the conditions of this extreme case can be maintained.

There may be some forces of which I am ignorant bearing upon this question, and if Mr. Aston, from whom I have learnt much, can enlighten me I shall be grateful.

JOHN HOLLAND.

EXHAUST POPPET VALVE DESIGN.

Sir,—Will you kindly allow me to reply to Mr. de Lissa, whose letter "*Re* Poppet Valve Design" appears in *The Motor Cycle* of February 14th? I feel very much indebted to Mr. de Lissa for so courteously and lucidly explaining why my M.A.G. gave trouble. First, I wish to make it quite clear that, in my opinion, the de Lissa is the only valve of this type which is really worth considering. The principle is quite correct, and I agree with Mr. de Lissa that it is as well to leave the valve alone. It runs cool and does not require grinding. Therefore, why do it? I ground my valves because of pitting due to road dust, etc., and I wish to repeat what I said in my last letter, *i.e.*, I ground them in correctly. I used the M.A.G. procedure, and obtained the same results, namely, poor compression cold, and absolutely perfect compression when hot.

Now, when running slowly the popping I referred to was due to weak mixture, as could easily be seen by looking at the carburetter. Every time a pop occurred vapour was blown out, and therefore the low-speed was what we usually call blow-back. This is quite beyond the point. I believe I said distinctly that the pop which troubled me was due to the exhaust valves and at high speed. I quite agree with Mr. de Lissa that if the valves are not ground in correctly this easily occurs; but then, my valves are correctly ground in. My reasoning was that the valve spring pressure was not sufficient, and this was increased, a little at a time, until the popping was eliminated.

My remarks as to the impossibility of moving the valves when at full lift were misinterpreted by Mr. de Lissa, due to my incomplete description. What I intended to convey was that the spring was too stiff for the purpose. Whereas while at the bottom of the lift it was possible to move the valve by hand, at full lift the extra load imposed by the spring was so great as to make it impossible to do so without levers. I might assure Mr. de Lissa that the coils of the spring were far from touching, and were perfectly in line with the valve. To get back to the original criticism of the de Lissa system, it is not the valve that is wrong, but the lever operating it. This lever is the same strength as the inlet lever, but I think Mr. de Lissa will agree that the loads imposed are vastly different. My solution of the job lies in reducing the weight of the valve distance piece and using a spring which was weaker per inch movement, but which was compressed further in order to give the same load on the valve; in effect, a much livelier spring and fewer inertia forces acting on the valve, tending to keep it open longer than is essential. These inertia forces cause the popping, and in a fast solo machine such as mine safety valve action or popping becomes a great nuisance.

Has Mr. de Lissa ever seen a cinema photograph of valves working at high speed? I mean a photograph showing the valves working so slowly that the action of the valves can clearly be followed, whilst in reality they may be "all out." It is often possible to see valves with as great a lag as 90° while the engine still functions, though not properly. If so, he will realise why I lay such stress on light valves and springs giving just sufficient load and no more.

In conclusion, I wish to make it quite clear that I am not prejudiced against the M.A.G., except in its exhaust valve rocker levers. These, in my opinion, are the only weak points in an otherwise excellent production.

OLIVOS.

Acton, W3.

THE UNITED COUNCIL OF MOTORING ORGANISATIONS.

Sir,—I have been a practical motorist since the very early days of motoring, and have also had something to do with the founding of the clubs and associations that were such a strong feature of those pioneer times. I therefore take a real interest in the agitation to found a United Council of Motorists. I am tempted, therefore, to ask a few straight questions. First of all, what work have the promoters of the United Council done for motorists, as distinct from motor manufacturers, garage proprietors, and dealers in cars, tyres, and accessories? No doubt they and the organisations which they represent honestly intend to do their best for the automobile movement as a whole, but what percentage of them can claim to represent the owners and users of cars and motor cycles? Again, assuming that each of the organisations composing the United Council is to send even only one delegate to the Council, to what extent and in what proportion are the private owners and users to be represented? If the "trade" be numbered in tens, those upon whom it exists—the owners and users—may be counted in thousands. [We have already explained that the user element is to predominate.—Ed.]

Is it likely that the proposed United Council of Motorists will do anything for the thousands, as distinct from the tens, which cannot be done—possibly more efficiently—by the R.A.C. and the A.A. and M.U. working in co-operation? "Unity," you say, "is strength," but proverbial philosophy often trips when it descends from the general to the particular. It is only sometimes, for instance, that "in a multitude of counsellors there is wisdom." Twelve delegates might conceivably talk twice as much as six, or four times as much as three, but talk alone will do nothing. Apparently the promoters of the United Council are intent on a multitude, for it has been suggested, I see, that the Council, well supplied with delegates from a variety of "trade" bodies, should be reinforced by an addition, or additions, from the ranks of motoring journalism. One may fail to see why it should; but if needs must, will you, Mr. Editor, suggest that there is any one man who could successfully hold a brief for the whole of the motor press? And, if not, are we to have half a dozen or more journalists on the Council?

Reading the latest comments upon the informal conference of February 1st, I see a strange insistence on the fact that the manifesto submitted for discussion "emanated apparently" or "emanated primarily" from the Motor Trade Association. *Was this conference convened by the Motor Trade Association?*

In any case, can it be pretended that it was convened by anybody who had the least concern for the interests of motorists as motorists, and not as purchasers and users of cars, cycles, or accessories?

United action, in anything, to serve any purpose, must be good. But, however anxious I may be to give the promoters credit for the best intentions, I feel that I, and at least a hundred thousand other users, in happier days, of cars and motor cycles, should know more of the antecedents of the bodies from which this United Council of Motoring is apparently to be recruited.

I would like more evidence that such a Council can do anything that the present governing bodies cannot. If I and others are to be convinced that the proposed Council can serve any useful purpose, let me suggest that the constituent bodies of this Council, electing delegates to it, should show us their right to be regarded as representing those on whom the automobile movement and the automobile industry, manufacturing and selling alike, depend for their future continuance in business—*car and motor cycle owners and users*, at home and Overseas.

(Rev.) F. W. HASSARD-SHORT.

My Ideal T.T. Mount.

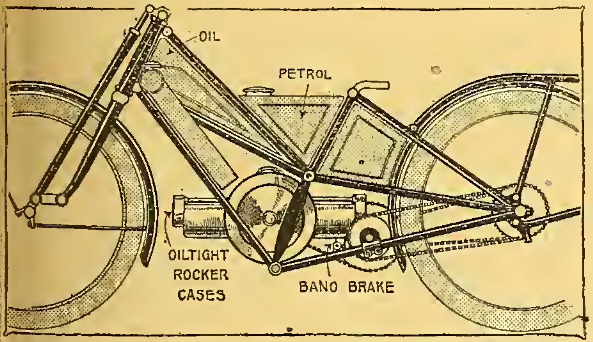
The following suggestive article, written by an experienced motor cyclist on his ideal machine, embodies some interesting points in the design of a machine intended primarily for road racing work. Our contributor definitely states that the T.T. is the ultimate end in his motor cycling life, and the machine he describes is designed with T.T. requirements kept to the fore.

I WILL admit at the outset that I have a strong prejudice in favour of the Scott type of frame, having tested its peculiar and undeniable advantages during several years' continuous riding of Scott machines, and having watched its marvellous performances in several T.T. races.

As nearly every motor cyclist knows, the T.T. course has certain marked characteristics—viz., long steady climbs, fast stretches downhill of indifferent surface, and numerous corners—and it was the Scott frame's peculiar capacity for successfully meeting the last two difficulties more than the type of engine fitted that accounted for its success.

If only we could introduce a well-balanced engine capable of very high revolutions for long periods into such a frame, we have theoretically a very promising combination.

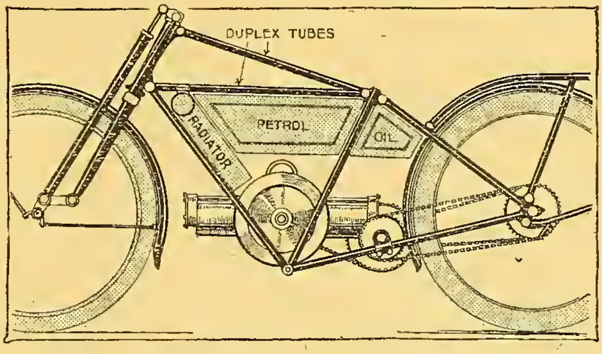
Whatever may be the pros and cons of water-cooling for touring machines in the hands of the general public, to my mind it has considerable claim on our very careful consideration for purely racing machines, where the ability of the engine to keep reasonably cool and at its most efficient working temperature during long periods at full load is of the utmost importance.



The frame design suggested in the accompanying article by "J. W. O." for a future T.T. mount.

Theoretically the most perfect power unit is the horizontally opposed overhead valve twin, but certain difficulties have arisen with the use of overhead valves in air-cooled engines which in practice have rather outweighed the advantages, viz., (1) liability of breakage [Very slight at present—Ed.] through overheating, and consequent damage to engine; (2) short period of accurate adjustment through excessive wear.

By adopting a proper system of water-cooling the liability to breakage can be practically eliminated. Anybody with any experience of o.h. valve water-cooled aero engines will vouch for the extreme rarity of valve breakages, and it must be remembered that an aero engine often works at full load for hours on end. Another important advantage of water-cooling would be the much greater reliability and longer life of plugs—possibly the most vital and troublesome items on a racing engine.



An alternative design by "J. W. O." for a future T.T. mount. The advantages claimed are dealt with fully in the accompanying article.

The second objection is more a matter of design than an inherent fault of the principle.

Why cannot the operating rods and rocker arms be completely enclosed, as is done in the case of the M.A.G. engines?

Variable Valve Timing.

Instead of a multiplicity of gears I have often wondered why sliding cams, giving varying degrees and angularity of opening and closing of both inlet and exhaust valves, have not been tried, the idea being to obtain more flexibility and steadier pulling power under load. Thus we could have an early opening and late closing for the exhaust valve for very high speed under light load, and a later opening for slower running and steadier pulling under load. The increased complication would be practically negligible, and the cams could be operated by a Bowden control from the handle-bar. As far as I can recollect, this system has never yet been tried on a motor cycle, although I have a recollection of it being tried on cars some years ago. In the hands of an experienced rider

My Ideal T.T. Mount.—

the results should prove interesting. What have some of our old T.T. experts to say to this suggestion?

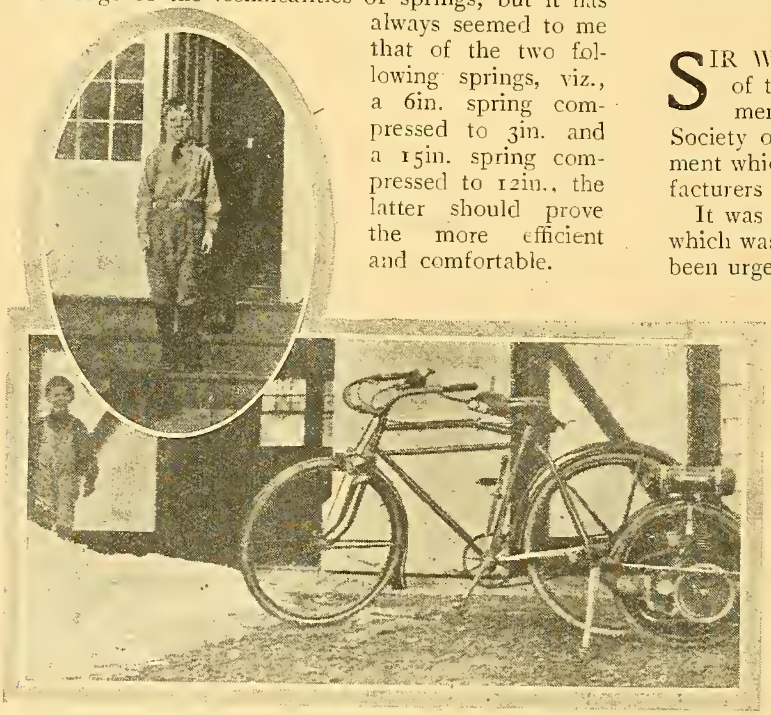
With regard to transmission, I think few experienced racing motor cyclists will disagree with me when I suggest a chain drive giving less trouble than present designs.

The Scott has shown what it can do with two speeds, and as the variably-timed engine I suggest should prove even better as regards flexibility and steady pulling under load, I vote for a simple type of change-speed gear without gear wheels, on the following lines, viz.: one noiseless pattern high-speed chain from engine to countershaft, and two slow-running roller chains to rear wheel, the change of gear being effected by a simple sliding dog clutch. This type of change-speed gear is very simple, and affords a considerable saving in weight over the orthodox gear box.

With regard to brakes. I make the rather revolutionary suggestion of putting two small band brakes *on the countershaft*, one acting through each chain and compensated with each other, both being operated by a single pedal. Front brake, small belt rim with shoe working on outside—Lea-Francis pattern.

Springing.

After a lengthy experience of most makes of spring forks, I have yet to find a better type than that formerly fitted to the F.N. lightweight. A movement of at least 3in. under severe road shocks is very desirable, and it is difficult, if not altogether impossible, to obtain this range with the usual short fork spring of the helical pattern. I claim no special knowledge of the technicalities of springs, but it has always seemed to me that of the two following springs, viz., a 6in. spring compressed to 3in. and a 15in. spring compressed to 12in., the latter should prove the more efficient and comfortable.



A Smith Auto-wheel used by an American school boy aged eleven years. He uses it for riding between his home and school. All mechanically-minded British school boys know they must reach the age of fourteen years before they can taste the joys of driving a motor cycle

It is generally admitted that the more efficient the front springing, the more perfect the control over indifferent surfaces, and consequently the higher the speed possible. I believe it is a fact that in several T.T. races the riders of some of the better machines could not let their machines out to their full capacity through sheer inability to steer them.

In conclusion, I would mention a few minor details, viz.: roller bearings throughout engine, foot-controlled oil pump for emergencies but automatic force feed for ordinary running, foot-controlled gear by rocking pedal, handle-bar controlled clutch, every nut spring-washered or split-pinned, three-ribbed tyres (Palmer or similar pattern), swing-up back mudguard flap as on Rudge, and spring saddle-pillar.

Suggested Advantages.

A few special advantages I would claim for my suggested design are as follow: (1) Exceptionally low centre of gravity, ensuring maximum speed in cornering; (2) a wonderfully efficient engine unaffected by overheating; (3) practically the whole of the weight centrally between the wheels; (4) a double-purpose engine for fast downhill work and steady pulling uphill; (5) an extremely efficient change-speed gear; (6) all control without moving the hands from the handle-bars.

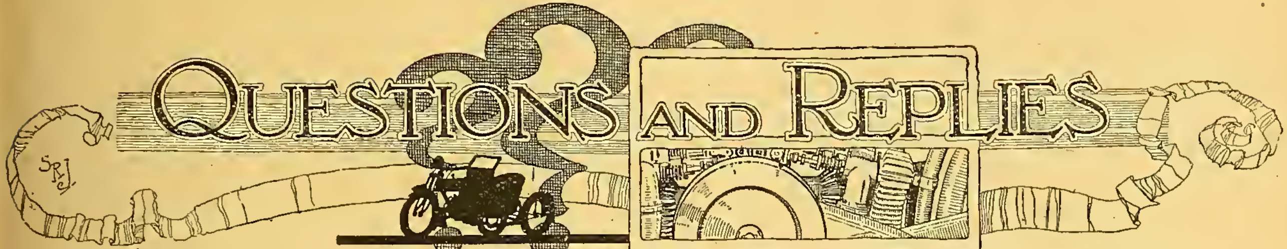
The great variation in design of power units, transmission, springing, and other details among the best makes shows that there is a considerable diversity of opinion, and I am strongly of opinion myself that by combining the best details of all the machines it is possible to produce a better and faster machine than any hitherto entered. J.W.O.

OVERSEAS TRADE.

SIR WILLIAM H. CLARK, Comptroller-General of the Department of Overseas Trade (Development and Intelligence), speaking at the Royal Society of Arts, described the functions of a department which was constituted for the assistance of manufacturers and traders in promoting their business.

It was a comprehensive attempt to solve a problem which was not a new one, but which for some years had been urged on the Government by the commercial and industrial community. The new Department was authorised to take action arising out of its commercial intelligence work in connection with the promotion of Overseas trade, subject, of course, to the exceptions that the larger issues of commercial and industrial policy were the concern of the Board of Trade, and that all matters affecting relations with foreign Powers must remain the concern of the Foreign Office.

Their organisation was, of course, far from perfect, but if, as they hoped, the foundations had now been laid on sound lines, the rest would follow quickly enough, provided the work were carried on with intelligence and energy, and provided always that they did not forget the important truth, viz., that a Government Department cannot help the commercial community efficiently unless it works in the closest co-operation with them.



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Cracked Parts.

(1.) Is it advisable to let an engine run with a cracked piston skirt? (2.) Does a cracked valve seating (exhaust) do the cylinder any harm, as it does not lose any appreciable amount of compression?—R.P.

(1.) It is not advisable to run any engine with a cracked piston skirt, although no damage will ensue if the crack develops into no more than a crack—*i.e.*, so long as the piece does not actually break off. (2.) The same is true as regards a cracked valve seating, but in both cases the crack is always liable to grow if left untouched, and this growth may be sudden.

Indian Gear Adjustment.

I shall be obliged if you will let me know if it is possible to adjust a two or three-speed gear on an Indian motor cycle road racer (1910).—C.V.P.

The adjustment you require is situated on the outside of the gear box, but we should advise you to apply to the makers—the Hendee Manufacturing Co., 366-333, Euston Road, London, N.W.—stating your difficulty, and asking them for an illustrated catalogue of the model you possess.

Steam Injection.

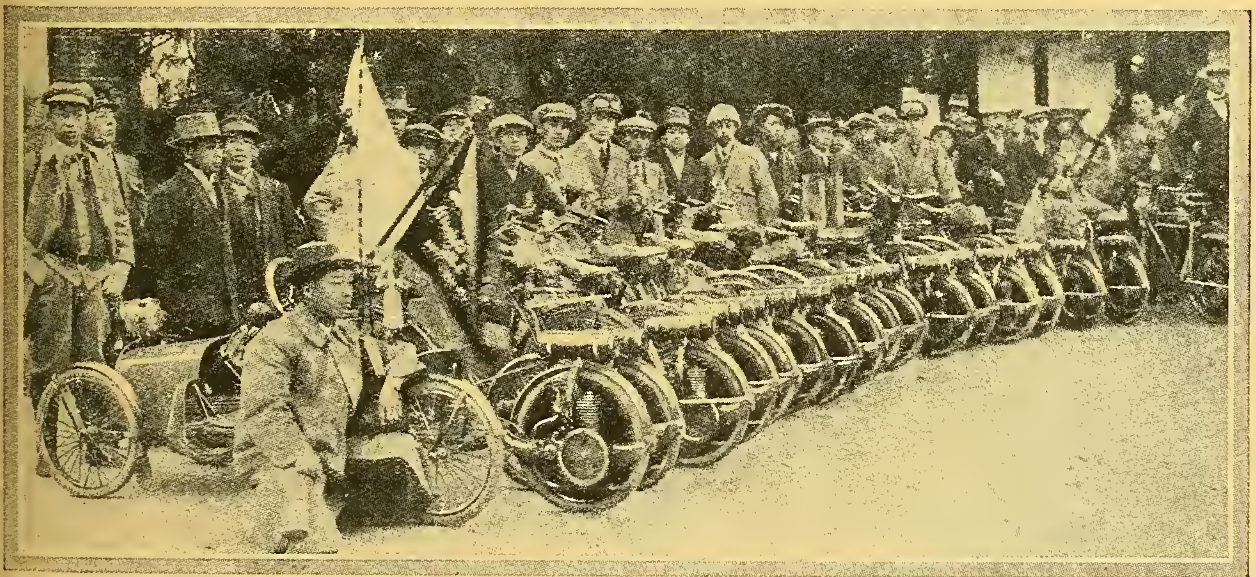
Will you please criticise and advise me on the following idea for fitting a steam injector to my motor cycle? (1.) After passing it round the exhaust pipe, lead the copper tube in at the extra air port of the Schebler carburetter so that the steam mixes with the gas in the mixing chamber. Would this be better than leading the steam in through the induction manifold or in at the main air intake at the bottom of the carburetter? (2.) Is it a disadvantage for the steam to enter in front of the throttle shutter on account of condensation? (3.) Is a small nozzle necessary, or merely the end of the copper tubing? (4.) What diameter tubing do you advise? (5.) What size would the water container have to be to run, say, 200 or 300 miles without refilling? (6.) The amount (roughly) of water injected? (7.) Is it necessary to feed the water under pressure? The container would be fixed approximately on the same level as the carburetter. (8.) Would a non-return ball valve be necessary?—J.L.F.

(1 and 2.) Leading the steam in through the induction manifold would be most likely to give satisfactory results. (3.) If you have a small nozzle you will need pressure to force the steam through it. If this can be easily provided a small nozzle would be an advantage. (4.) About $\frac{1}{16}$in. (5.) About a quart. (6.) The whole amount in the container practically. (7.) There is no actual necessity to feed the water under pressure, but the container should be on a lower level than the carburetter for preference. (8.) We do not think so; but it might be useful. We do not think the amount of heating to which you intend to subject the copper water pipe will be quite adequate for your purpose. It should pass round the exhaust pipe at least four or five times.

Magneto Juggling.

The angle of my magneto is set at 180°, and is worked off the half-speed wheel. Would driving it off the 2 to 1 wheel have the same effect as altering the angle to 90°? I want to use the same magneto (180°) to work an engine which is at present worked by contact breaker set at 90° and driven off the half-speed wheel.—N.H.

We take it that by the 2 to 1 wheel you mean the main driving pinion. If this is the case, your assumption is correct. If you have a magneto set at 180°, you may use it to ignite a twin engine of 90° driving the magneto directly from the mainshaft pinion.



Japanese motor wheel enthusiasts at Nagoya. Japan offers a big field for the motor cycle manufacturer, as the Americans have already realised. (See page 237.)

Books.

Have you a book—or can you recommend one—dealing thoroughly with the repairing of magnetos?—A.M.

So far as we are aware, there is no book dealing solely with the repairing of magnetos, but "Electricity and the Motor Car," published by Messrs. Iliffe and Sons Ltd., 20, Tudor Street, London, E.C.4, deals thoroughly with magnetos, and a fair amount of space is devoted to magneto troubles. "Motor Cycles and How to Manage Them," also published by Messrs. Iliffe and Sons Ltd., deals very fully with magneto ignition on motor cycles.

Cycle Car Questions.

(1.) Is there any objection to having a cycle car with two wheels at the rear and one in front instead of with one wheel at the rear? Why not one in front and two at the rear. The rear has all the weight and drive. (2.) What is the tax for a four-wheeled light cycle car?—R.P.

(1.) This is largely a matter of opinion. Experiment has proved that to have two wheels in front gives more satisfaction in general service, as two wheels behind need the use of a differential gear or only one wheel can be driven. The various arguments in favour of each type have been dealt with from time to time in *The Motor Cycle*. (2.) The tax on a four-wheeled car depends on the horse-power. For 8 h.p. up to 12 h.p. it is three guineas.

Hub Gear Queries.

(1.) I have obtained a petrol permit and licence to use my motor cycle while home on leave. Shall I require to have the Inland Revenue licence? (2.) Shall I require a driving licence before I can drive, or will my last year's one be good enough? (3.) Are the 1912 and 1913 3½ h.p. Ariel models fitted with ball bearings or plain bush on the crankshaft pulley end? (4.) Is the Ariel fitted with roller or plain connecting rod big end bearing? (5.) What sort of bearing has the crankshaft on the timing side? (6.) Will a three-speed hub gear fit the frame of this machine, owing to the kinked part for the belt rim? I thought this would foul the spokes of a three-speed belt pulley. Am I correct? (7.) Would the belt line on my engine and that on a three-speed hub gear be the same?—R.P.

(1 and 2.) You will be compelled to take out an Inland Revenue licence and also a driving licence if your existing licences are not current, *i.e.*, if they have expired. A driving licence lasts for twelve months from the date of issue, and not for a calendar year as is the case with an Inland Revenue licence. (3 and 5.) The majority of 1912 and 1913 3½ h.p. machines were fitted with plain bearings on the timing gear side and ball bearings on the pulley side of the mainshaft. (4.) The connecting rod has plain bearings. (6.) A three-speed hub can be fitted, but new belt and seat stays will also have to be fitted. The belt line of the engine and that of the three-speed gear are the same, or the belt line of the gear can be made the same as that of the engine.

Misrepresentation by Dealer.

In April last year I bought a 3½ h.p. twin James from a well-known London firm, which they represented to be a 1915 model, for £44, which was about its market value. In about a couple of months I was warned for Overseas again, and sold the machine to a friend as a 1915 model. He had considerable trouble with the machine, and when in communication with the makers discovered the fact that the machine left them in February, 1914. Now when I arrive home again my friend will naturally take the matter up with me, and ask me what I intend to do? Can you advise me of my position with regard to him and the dealers (I hold their receipt stating the machine to be a 1915 model)?—C.T. (Lt., A.S.C.).

In our opinion, you are responsible to your friend, but in your turn you can recover from the vendors of the machine, as it was sold as a 1915 model.

Petrol for Leave.

I believe it is now legal for people on fourteen days' leave to the United Kingdom from France to ride or drive motor cycles and cars for joy-riding purposes. If this be true, can you please tell me: (1.) May passengers (civilians) be carried? (2.) Must the driver have an up-to-date licence for driving and for the machine? (3.) May twelve (?) gallons of petrol, or rather a ticket for it, be had at the Petrol Controller's office in London?—V.T.A.

(1.) The carriage of passengers makes no difference whatever to the use of the machine, and if you have the right to use petrol you may take any passengers you wish. (2.) All licences, of course, must be up-to-date. (3.) You should apply for a petrol permit to the Petrol Control Dept., 19, Berkeley Street, London, W.1, about three weeks before you expect to come home on leave. If you have not this time at your disposal, you should write to the Controller, placing the full circumstances of the case before him, and expressing your intention to call on a certain date for the permit.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week.

That Inland Revenue Tax!

Will you kindly let me know if I shall have to pay the £1 tax for my motor cycle, as I can only use it purely for business?—H.P.

You will have to pay the £1 tax unless the machine is *constructed* and *used* solely for the conveyance of goods.

Electric Lighting.

(1.) Can you give me a sketch of how to wire up my solo machine from an accumulator to run with a bright head light and only a glimmer in the rear one; so that I can switch over to have only a glimmer both front and rear for use while leaving the machine by the wayside? My lamps are insulated. (2.) What would be the most suitable bulbs to use, candle-power and volt, etc.? (3.) What would be the best accumulator to use, volt and ampère hours and how many cells? (4.) Where could I obtain bulbs and accumulators? I have lamps.—R.P.

(1. and 2.) The answers to these queries will be found in *The Motor Cycle* of February 21st. (3.) We think you cannot do better than use any good accumulator of four volts, forty amps. The voltage of the bulbs will depend, of course, on that of the accumulator and on the principle of wiring. (4.) Any good agent should be able to supply these.

EXPERIENCES WANTED.

"B.S." (Salop).—3 h.p. Enfield. Efficiency of lubrication system, speed, maintenance of power, and general efficiency.

"C.E.T." (London).—Henderson and Zenith motor cycles, also Morgan Runabout. Consumption, reliability, tyre and transmission wear.

RECOMMENDED ROUTES.

Scorton to Rothbury.—H.B.

Scorton, Croft, Darlington, Ferryhill, Durham, Chester-le-Street, Newcastle, Morpeth, Rothbury.

Dewsbury to Edgware (London).—D.M.

Dewsbury, Wakefield, Doncaster, Bawtry, Retford, Tuxford, Newark, Grantham, Stamford, Norman Cross, Alconbury Hill, Buckden, Eaton Socon, Biggleswade, Baldock, Stevenage, Welwyn, Hatfield, Barnet, Potters Bar, Ganwick Corner, Boreham Wood, Elstree, Edgware.

Wareham to Lincoln and York.—F.T.A.

Wareham, Wimborne, Cranborne, Salisbury, Andover, Kingsclere, Aldermaston, Reading, Henley, Marlow, High Wycombe, Amersham, Chesham, Tring, Ivinghoe, Dunstable, Ampthill, Bedford, Eaton Socon, Stilton, Peterborough, Market Deeping, Falkingham, Sleaford, Lincoln. To reach York from Eaton Socon continue through Buckden, Alconbury Hill, Norman Cross, Stamford Grantham, Newark, Tuxford, Retford Bawtry, Doncaster, Ferrybridge, and Tadcaster to York. The distance is approximately 245 miles and 315 miles.

Despatch Riding

HALL - MARKS or DAMNS
—— A MAGNETO ——

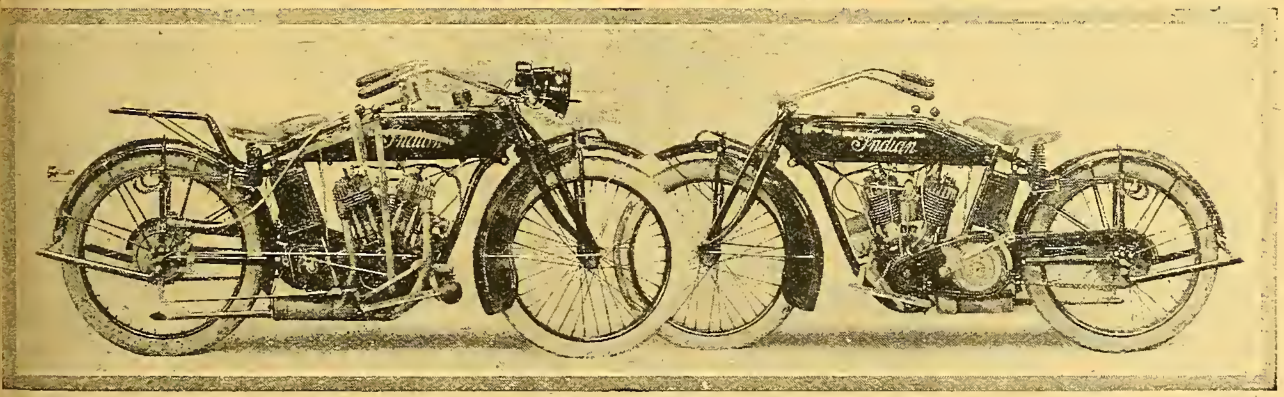
C.A.V. Magnetos
BRITISH THROUGHOUT

are in universal use by our Despatch Riders at the Front——*verb. sap.*

Folder "F" and spare parts list post free

C. A. Vandervell & Co., Ltd.
Electrical Engineers
ACTON, LONDON, W.3
Members of the British Ignition Apparatus Assn.

1918 Powerplus Indian Motocycles



Which we trust will be Post-War Models.

We regret that we are not in a position to supply motorcycles at the present time, but we can send 1918 abridged descriptive lists on application. This applies to Great Britain only.

"Indian Motocycle" Hendee Manufacturing Co.

HENDEE MANUFACTURING CO.,
"Indian House," 366-368, Euston Road, London, N.W.
Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA, 109-113, Russell St., Melbourne.
CANADIAN WORKS, 12-14, Mercer St., Toronto.
AFRICA, Indian House, 127-9, Commissioner Street, Johannesburg.
Indian House, 579, West Street, Durban.
Indian House, Strand Street, Port Elizabeth.

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns —First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller. but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged: when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

2¾h.p. A.J.S., 1916, 2-speed, clutch, kick starter, enclosed drive, speedometer, perfect; £35.—Railway Garage, Staines. [3671

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—A.J.S. 1916 De Luxe combination, spare wheel; 89 gns. [3801

A.J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

A.J.S., 2¾h.p., latest model, 3-speed, C.S., original tyres, unscratched, perfect throughout; £46.—Newman, 115, May St., Basingstoke. [3762

A.J.S., 1914, 2-speed, clutch, and K.S., all-chain drive, £35; 1913 model, £33; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X2406

A.J.S., 1915, 4h.p. twin, 3-speed countershaft gear, kick starter, and free engine clutch, excellent condition, with all accessories; price £55.—Wauchope's, 9, Shoe Lane, London. [3767

6h.p. A.J.S. 1916 Model de Luxe Combination, complete, dynamo lighting set, electric hooter, speedometer, and spare horn, and all accessories, not been used for the last 9 months; will guarantee this machine on any condition; price £80.—Watson, Foresters' Arms, 94, Brady St., Bethnal Green, E.2 [3689

IF IN NEED OF A
Motor Cycle
or Combination
EITHER FOR
WAR WORK or BUSINESS PURPOSES,
WRITE TO
GODFREY'S LTD.
They can supply you from stock, and you can rely on getting value for your money.
SEND FOR FULL LIST OF NEW AND SECOND-HAND MACHINES.
EASY TERMS.
GODFREY'S LTD.
208, Gt. Portland Street, LONDON, W.1.
'PHONE: 7091 MAYFAIR (2 Lines).

You would not take your watch to a Blacksmith for repair—
neither should you take your
DIXIE
OR SPLITDORF
MAGNETO
for repairs or spares elsewhere than to the direct factory representatives:—
American Supplies Co. Ltd.
162 Grt. Portland Street, LONDON. W.1
'Phone: Mayfair 3258.

CLEAN ALUMINIUM, BRASS, and GUNMETAL
CASTINGS
For AIRCRAFT, MOTORS, and MOTOR CYCLES
SAMUEL F. ROGERS
(Metallurgical Chemists & Metalographists),
CALEDONIAN WORKS, PRINCE'S END, TIPTON.

DEFENCE OF THE REALM AC

Under the provisions of the above Ac advertisers requiring workmen, and whos business consists wholly or mainly engineering or the productions of munitior of war, or substances required for the pr duction thereof, and whose works a situated within 30 miles of London, mu include in every such advertisement th words, "No person resident more than miles away, or already engaged on Gover ment work, will be engaged."

Advertisers whose works are situate more than 30 miles from London can onl have their announcements inserted wi the approval of the Board of Trade, wh will allocate to each advertisement a bo number, and collect and distribute to t advertiser all replies received. The nece sary forms of application can be obtaine from any Labour Exchange or from th offices of this paper, and each advertis ment must contain a clear reference to t effect that no person already engaged Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. Motor Cycles.—Immediate delivery of th latest 6h.p. models from stock. — The Specialists, The Walsall Garage, Walsall. Tel.:

1916 A.J.S., 2¾h.p., new September, sporting 3-speed, clutch, Lucas lamps and horn, S speedometer, excellent condition; £50.—S.S.M. 72, Bootham, York.

A.J.S. Motor Cycles.—Immediate delivery of 1917 model, complete, detachable wheels, 80 tyres; £91/6; trade supplied; no permits re —P. J. Evans, Sole Agent for Birmingham an trict.

1916 4h.p. A.J.S., No. 8,078, with coachbuil car, spare wheel and tyre, hood, screen, lamp set, mechanical horn, speedometer, set too cellent condition throughout.—Robinson's Garage, St., Cambridge.

A.J.S., 6h.p., and sidecar, with wind screen, lam horn; this is one of the latest 1915 models out, as it left the works in October, 1915. The has been thoroughly overhauled and revarnishe is practically equal to new in every possible re price only 80 gns.—Julian, 84, Broad St., R Biggest light car and motor cycle dealer in the 'Phone: 1024. Closed Wednesdays 1 o'clock.

Alldays.

RIDER TROWARD and Co., 31, 40b, 78, Hi Hampstead.—Allon, 1916, 2-speed, 2-strok gns.

ALLON, 1917¾, 2-stroke, 2-speed, hand clutc done few miles, like new, best accessories, £37.—46, Mary Rd., West Bromwich.

ALLDAYS Allon, 1917, 2-speed, clutch mod accessories, under 1,000 miles; £37/10.— Carter, 262, Croxted Rd., Herne Hill, S.E.24.

1915 Allon, 2-stroke, 2-speed, Millers lamps, mechanical horn, splendid condition: Cousins, Motor Engineer, Panhale Rd., Eastbou

ALLON, 2¾h.p., single, £38, new; 2-speed, £4 2-speed and hand clutch, £48, new; single £22/10; 2-speed, £28/10; E.P., or exchange.— Co., 292, High Holborn, London.

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., countershaft models in stock.

SECOND-HAND 2½h.p. Ariel, good condition, lamp and generator, new Michelin; £17/ Coles, Beaumont House, Green St., Enfield H

Auto-Wheels.

AUTO-WHEEL, spares, £7, offers; lady's cyc sidered.—Write, 12, Asmuns Hill, Hendon.

WALL Auto-Wheel, good condition: £7.— Greenhill Rd, Harlesden, London, N.W

GENUINE Wall Auto-Wheel, little used, co £8/10.—Murray, 37a, Charles St., Hatton Holborn.

AUTO-WHEEL, B.S.A. de Luxe, perfect co 12 gns., or nearest.—6, East Parade, Staak Co. Durham.

AUTO-WHEEL Attached to Dingwall Witham tricycle, both as new; or would be sold se —Hucklebridge, 133, Sloane St., London, S.W.1.

MOTOR CYCLES FOR SALE.

Bat.

ER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Bat-Jap, 1914, 6h.p., sporting model, d, clutch, kick start, double-seater sidecar, 42 gns.; p, 1911. 6h.p., 2-speed combination, 21 gns. (D) [3802

Bradbury.

4 4h.p. Bradbury and Sidecar, like new; £17/10, bargain.—29, St. Leonard's St., Bow. [3754

3 4h.p. Bradbury Combination, 3-speed, complete, perfect condition; what offers?—Davies, Wendros, h, Pem. [X2328

DBURY 1914 4h.p. Combination, 2-speed, perect condition; £30, or near offer.—102, Grove Dulwich, S.E. [3752

ER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Bradbury, 1912, 3½h.p., 2-speed, fine order, 19 gns.; Bradbury, 1914, 2-speed, rshaft, 29 gns. [3803

Brough.

UGH 1916 Model, 2-speed, including lamp; 45 ns.; this machine is one of the greatest bargains .—Julian, 84, Broad St., Reading. Biggest light ad motor cycle dealer in the South. 'Phone: Closed Wednesdays 1 o'clock. [0736

UGH, 1915, 3½h.p., 2-speed countershaft, £42/15; 1916, 3-speed Sturmey-Archer counterkick starter, hand clutch, P. and H. head and amp, horn; Stewart speedometer, etc., £55, or Watsonian sidecar, £65/10; E.P., or exchange.—Co., 292, High Holborn, London. [X2417

Brown.

.p. Brown, B.B., in perfect running order; £5, or exchange gent's bicycle.—58, Lime Grove, New n. [3748

B.S.A.

3-14 B.S.A. Outfit, splendid condition, 2-speed. kick start; £30, or very near offer.—J. Lind-93, High St., Crawley, Sussex. [3668

ER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—B.S.A., 1913, 3½h.p., 2-speed, clutch, start, 25 gns.; B.S.A., 1915, 4¼h.p., 3-speed, all-42 gns. [3804

A., 1916, 4½h.p., countershaft 3-speed, chain-cum-elt, lamp, generator, and horn, in perfect condiidden only about 1,000 miles; £45.—Moore, Coach , Andover. [3678

A., 1915, 4¼h.p., countershaft 3-speed, Lucas amps, horn, real good condition; £43, or would in exchange good 2¾h.p. Douglas, late model. re, Red Lion, Sleaford. [X2363

6 B.S.A., 4¼h.p., chain-cum-belt, complete with lamps, horn, and Watford speedometer, done miles only, and in first-class order; £53; can be Munition Area Recruiting Office, Victoria Sq., rd. [X2362

2-13 B.S.A., 3½h.p., 2-speed (1915), countershaft, chain-cum-belt, Binks, complete with tools, aces, just overhauled, new piston and tank, exorder; £32, or nearest.—Jas. Barrons, Ponteland, mberland. [X2370

A., 1915, 4¼h.p., Model K, with 1916 genuine 18/18 No. 2 sidecar, and 1917 F.R.S. dynamo g set, in perfect condition, mileage 3,000, 3 lamps, electric horn, hood, luggage carrier, etc.; no offers; London.—Box L5,714, c/o *The Motor* [3742

Calthorpe.

ER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Calthorpe, 1916, 2-stroke, 2-speed; .; Calthorpe, 1916, J.A.P., 2-speed, 25 gns. (D) [3806

THORPE-J.A.P., 2¾h.p., bought new September, 917, 2-speed, Enfield gear, as new; £30, or close -J. Lindfield, 93, High St., Crawley, Sussex. [3669

THORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits ed.—P. J. Evans, 91, John Bright St., Birming- [3713

THORPE-J.A.P., 1916 model, 2-speed, speedmeter, 3-note horn, head lamp, generator, rear Dunlop studded tyres, as new throughout; bar-£30.—Mebes and Mebes, 154-6, Gt. Portland St., [3611

Chater-Lea-Peugeot.

p. Twin Chater-Lea-Peugeot, Bosch mag., Druids, good order; bargain, £25.—Apply, W. Smith, horpe Grove, Battersea, S.W.11. [3691

Clyno.

ER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Clyno, 1915 de luxe combination, wheel, 72 gns.; Clyno, 1915, 2-stroke, 2-speed, , 23 gns. (D) [3808

Connaught.

ER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Connaught, 1915, 2½h.p., 2-stroke, 3- 24 gns. (D) [3810

Coventry Eagle.

ER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Coventry Eagle, 1916, 2-stroke, 2- 24 gns. (D) [3809

ELCE & Co

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1917 **HARLEY-DAVIDSON** Combination, in new condition, lamps and horn ..	£115 0
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1916 **ENFIELD** Combination, 6 h.p., lamps, horn, splendid order	£75 0
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1916 **B.S.A.** and Millford Sidecar, 4¼ h.p., chain-cum-belt	£65 0
1914 **ENFIELD** Combination, 6 h.p., lamps, horn; bargain	£45 0

SOLO MACHINES.

1917 **ZENITH GRADUA,** 4-5 h.p., clutch, kick-starter, lamps, horn; indistinguishable from new	£70 0
1916 **BROUGH,** 3½ h.p., 3-speed, horizontal twin, fully equipped	£55 0
1917 T.T. **ROVER,** Philipson pulley, lamps, horn, as new	£45 0
1916 T.T. **NORTON,** Brooklands model, fully equipped	£45 0
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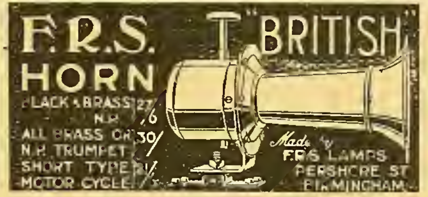
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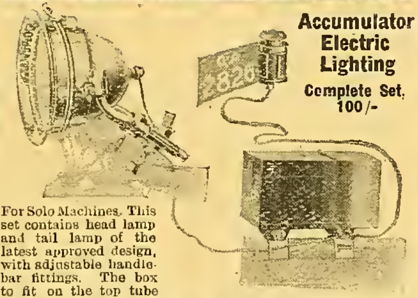

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Crescent.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Crescent, 1917, 2-stroke, 2-speed; 25 gns. (D) [3807

Dalm.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Dalm, 1917, 2-stroke, as new; 19 gns. (D) [3812

Dayton.

TWO 1915 Dayton de Luxe 2-strokes, want little tuning; £12/10 and £14/10; good condition.—Darke, Waterloo House, London Rd., Sutton, Surrey. [3743

Dot.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Dot-Jap, 1913, 8h.p., 2-speed combination; 35 gns. [3813

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50. [5855

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

DOUGLAS, 2¾h.p., 1915, 2-speed, speedometer, Bosch, footboards, lamps, splendid condition; £40. —Thorby, 203, York Rd., Southend-on-Sea. [3690

DOUGLAS, 1914. 2-speed, very little used, fast, new tyres, speedometer, excellent condition throughout; 35 gns.—Lieut. Cope, Halcyon, Crescent Rd., Sidcup. [3784

DOUGLAS, 1913, 2-speed, Bosch mag., £32/10; Model V, practically new, issued late 1917, £57; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X2402

DOUGLAS, 1914½, 3½h.p., in perfect condition, Amac carburetter, 2-speed, mechanical horn, tools, etc.; reasonable offers.—Lieut. Walker, Gloucester Regt., Clacton-on-Sea. [X2377

T.T. Douglas, 2¾h.p. (1913-14), 2 speeds, brand new 1917 Amac, lamps, Klaxon, etc., overhauled and re-enamelled, unused two years; bargain, £34.—Bennett, 16, Lansdowne Place, Brighton. [3675

DOUGLAS, 2¾h.p., 3-speed, Colonial Model, late 1915, with 1917 light C.B. sidecar, the outfit has done little work, original tyres in very good condition; 45 gns.—Goodman, 36, St. Benedict's St., Norwich. [3674

DOUGLAS, 1913, 2¾h.p., 2-speed, Bosch, Amac, footboards, head lamps, Dunlop tyres, in good condition; must sell; £25. or near offer; owner joining army.—J. P. Hyams 47a, Picton St., Camberwell, S.E. [3745

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1914 2-speed Douglas, £34/10; 1915, £39/10; War Office Douglas, £39/10.—Motor Exchange, Horton St., Halifax. [3728

1916 Douglas, lovely coachbuilt Combination, 4h.p., mag., 3 speeds, clutch, kick, sump lubrication, complete with 3 lamps, speedometer, mechanical horn; expert examination, any trial, greatest bargain in England; 65 gns.—Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). [3777

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Douglas, 1911, single speed, 14 gns.; Douglas, 1912, single speed, 18 gns.; Douglas, 1913, single speed countershaft, 21 gns.; Douglas, 1913 T.T., 2-speed, 28 gns.; Douglas, 1915 T.T., 2-speed, 36 gns.; Douglas, 1915, 4h.p., 3-speed, coach-sidecar, 62 gns.; Douglas spares stocked. [3811

1917 2¾h.p. Douglas, Model W, hand-controlled clutch, kick start, latest improvements, £54, plus 20%; also Models U and V, 1916 specification, £50, plus 10%; absolutely new; immediate delivery against priority permits for doctors, farmers, war and munition workers; how and where to apply.—Full particulars, write, Douglas Specialists, Robinson's Garage, Green St., Cambridge. [3769

Edmund.

1915 Edmund, beautiful canoelet coachbuilt sidecar, twin, M.A.G. engine, mag., Enfield 2-speed gear, kick, lamps, mechanical horn; 46 gns.; exchanges.—Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). [3779

Enfield.

ENFIELD Combination, new June, 1916, new tyres, all accessories; £69.—Bruce Wood, Horn Park, Lee, S.E.12. [3708

ENFIELD 1916 6h.p. Combination, £75; also late 6h.p. combination, like new, £55, bargain.—29, St. Leonard's St., Bow. [3753

1914 Enfield Combination, 6h.p., lamps, horn, etc.; £45.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0551

1916 Royal Enfield 6h.p. Combination, lamps, hood, screen, practically new condition; £75.—W.S., 65, Elgin Rd., East Croydon. [3757

1917 Enfield Combination (July), all as new, wind screen, lamps, horn, spares, tools, petrol; £90, bargain; not used last 5 months.—Johnson, 2, Hazel St., Warrington. [X2331

MOTOR CYCLES FOR SALE.

Enfield.

ROYAL Enfield Combinations, from £45; special good opportunity to secure a good turnout.—At Wauchope's, 9, Shoe Lane, London. [3766

1915 2-speed Twin Enfield, new tyres, kick start: bargain, £32/10; any examination, or exchange. —185, Brighton Rd., South Croydon. [X2325

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special O.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

ENFIELD, 1914. 6h.p., 2-speed, coach combination, in fine order, £62/10; 1915 model, £72/10; 1916, £82/10.—Motor Exchange, Horton St., Halifax. [3729

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X2407

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Enfield, 1917, 3h.p., 2-speed, clutch, kick start, 42 gns.; ditto, 1915, 34 gns.; Enfield 1917 standard combination, 77 gns.; ditto, 1916, 72 gns. (D) [3814

1916 (late) Royal Enfield 6h.p. Combination, unscratched. hardly used, oversize tyre on rear, hood and screen, Lucas dynamo lighting set, tools, perfect condition; worth £110, price £90.—Braid, Gwynfa, Abergele, N.W. [X2109

Excelsior.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—British Excelsior, 1916, 2-stroke, 2-speed; 25 gns. [3805

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—American Excelsior, 1915, 7-9h.p., 3-speed, sporting sidecar; 65 gns. [3800

AMERICAN Excelsior, 7-9h.p., latest model, done about 1,000 miles, K.S., 3-speed, like new; £50; lightweight part considered.—Box 1,746, c/o *The Motor Cycle.* [X2372

1918 8h.p. Excelsior-Jap Combination, Sturmey-Archer countershaft, electric lighting, Bennicksen, Klaxon, De Luxe sidecar, with cover-all apron, luggage carrier, etc., condition new, guarantee perfect; willing submit to expert examination; cost £100 few months ago; immediate sale £78.—Springfield, Corley Moor, Coventry. [X2422

F.N.

F.N. (late), 2½h.p., mag., 2 speeds, clutch, shaft drive; must sell; £12/15.—1, Ebner St., Wandsworth. [3778

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—F.N., 1913, 5-6h.p., 2-speed, clutch, good order; 29 gns. (D) [3815

TAKEN for Debt.—F.N., 2¾h.p., 2-speed, clutch, free engine, shaft drive, paraffin, perfect order; £12, or near offer.—46, Huxley Rd., Upper Edmonton, N.18. [3710

Harley-Davidson.

HARLEY-DAVIDSON 7-9h.p. Combination, electric lights, nearly new condition; bargain.—Andrews, Settle. [X2299

HARLEY 1917 Combination, practically new, complete with lamp and speedometer, horn, etc.; £120; E.P., or exchange.—Service Co., 292, High Holborn, London. [X2418

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Harley-Davidson 1915 electric combination, 69 gns.; Harley-Davidson, special T.T., 3-speed, electric, khaki finish, disc wheels, 65 gns.; Harley parts stocked. (D) [3819

LATE 1916 Harley-Davidson Combination, unapproachable condition, as new, electric light, Pillion seat, Klaxon, everything complete, only used four months; £85.—Apply, Flight Sergeant Brown, No. 5 Stores Depot, R.F.C., Empress Hall, Earl's Court. 'Phone: Western 3381. [3723

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X2404

Henderson.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Henderson, 1915, 10h.p., 2-speed, disc wheels, coach sidecar; 69 gns. [3817

Hobart.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Hobart, 1915, 2-stroke, 2-speed; 22 gns. (D) [3816

Humber.

2¾h.p. Humber, F.E., just overhauled, in good order; £5/10.—Wood, 36, Springwood St., Huddersfield. [3688

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Humber, 1915, 4h.p., water-cooled combination; 45 gns. (D) [3818

3½h.p. Humber, 2-speed, good condition, also sidecar; £25, or would exchange lightweight.—Somerset House, Stanley Rd., Teddington. [X2217

HUMBER, 3½h.p., 1912, 2-speed, new coach body, paraffin vaporiser, all accessories, splendid condition; what offers?—C.R., 63, Portobello Rd., Bayswater, W. [3764

RIDER TROWARD & Co

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A.J.S., 1916, de Luxe Comb., spare wheel	89 gns.
B.S.A., 1915, 4¼ h.p., 3-speed, all-chain	42 gns.
CALTHORPE-J.A.P., 1916, 2-speed, clutch	24 gns.
DOUGLAS, 1915, T.T., 2-speed	38 gns.
ENFIELD, 1917, 3 h.p. twin, 2-speed, clutch	42 gns.
ENFIELD, 1917, 6 h.p. Combination, as new	76 gns.
HARLEY-DAVIDSON, 1915, dynamo, 28 guinea Sidecar	69 gns.
HARLEY-DAVIDSON, 1915, T.T., 7-9 h.p., disc wheels, 3-speed, dynamo, electric lighting, olive-green finish	65 gns.
INDIAN, 1916, T.T., 7-9 h.p., clutch, as new	41 gns.
JAMES, 1916, 2-stroke, 2-speed	26 gns.
LEA-FRANCIS, 1915, 3½ h.p. twin J.A.P., 2-speed, clutch	48 gns.
NORTON, new, 1918, 3-speed military model	£82 0
NORTON, 1916, T.T., Brooklands model, khaki finish	48 gns.
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RUDGE-MULTI, 1916, Standard	45 gns.
RUDGE-MULTI, 5-6 h.p., 1915, coach Sidecar	47 gns.
ROVER, 1917, 3-speed, as new	59 gns.
SCOTT, 1915, coachbuilt Comb., fine order	45 gns.
TRIUMPH, 1914, T.T., clutch, Philipson ..	32 gns.
TRIUMPH, 1914, 4 h.p., 3-speed, coach Sidecar	44 gns.
ZENITH, 1916, 4-5 h.p. twin, as new	56 gns.

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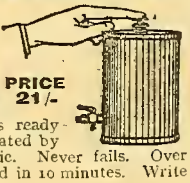

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For Triumphs, Bradburys, etc.
£3 : 13 : 0
Ball Thrust, **£4 : 0 : 0**
Lightweight, **£2 : 10 : 0**
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Humber.

HUMBER, 1914, with coachbuilt sidecar, 3½-4 mag., 2 speeds, F.E.; any trial; almost gift gns. cash.—Wandsworth Motor Exchange, Ebner Wandsworth (Town Station). [

Indian.

1915 5h.p. Indian and Sidecar, 3-speed, el light, speedometer, Lucas horn, new tyres; —26, Warrender Rd., Tufnell Park. [

INDIAN, 7-9h.p., 1914, just overhauled, disc wh Stewarts, watch, 2 speeds, Gloria sidecar, 3 tric lamps, horn, £15 spares; £45.—Fox, 28, St., S.W.1. [

1915-16 7-9h.p. 3-speed Canadian Indian Com tion, spring frame, speedometer, mileage 4 perfect condition; the original owner killed in £70.—W. J. P. Wills, Weston Rd., Bridgwater, So set. [

RIDER TROWARD and Co., 31, 40b, 78, High Hampstead.—Indian, 1914, 7-9h.p., spring fr 2-speed, 34 gns.; Indian, 1915 T.T., 7-9h.p., cl 37 gns.; ditto, 1916, 41 gns.; Indian, 1914. s frame combination, new sidecar, 48 gns.; Indian stocked. (D) [

James.

RIDER TROWARD and Co., 31, 40b, 78, High Hampstead.—James, 1916, 2-stroke, 2-speed gns. (D) [

1915 4¼h.p. James Canoelet Combination, s turnout; cash £47/10; exchange lightweigl twin, cash adjustment.—Campbell, Buntingford. [

JAMES 1916 4¼h.p. 3-speed Combination, cou shaft, kick, lamps, tools, good condition; £ Kelcher, Bellagio, Manse Rd., Wishaw, Scotland. [X

JAMES, all models, new and second-hand; exte payments or exchange; specially built 5-6h.p. bination, dynamo lighting, finest combination turned out, £120.—Service Co, 292, High Hol London, W.C.1. [X

1915½ 3½h.p. James Twin, h.c. clutch, and cou shaft 3-speed, enclosed chain drive, F.R.S. tric lighting set and horn, Stewart mechanical horn speedometer, new Dunlop tyres, the whole like ne all-black finish; £45.—Sgt. Pearce, R.E., Hall Upper Dovercourt, Essex. [

Kerry.

KERRY, 5-6h.p. twin, Bosch, B. and B., D free engine; £16/10, offers; ride away.—St 182b, Elm Rd., Kingston-on-Thames. [X

RIDER TROWARD and Co., 31, 40b, 78, High Hampstead.—Kerry-Abingdon, 1913, 4h.p., 2-s coach sidecar, 24 gns.; Kerry-Abingdon, 1914. 4h. speed Philipson, 24 gns.; Kerry-Abingdon, 1913, smart machine, 22 gns. (D)

Lea-Francis.

RIDER TROWARD and Co., 31, 40b, 78, High Hampstead.—Lea-Francis, 1915, 3½h.p. twi speed, chain drive; 48 gns. (D)

Levis

LEVIS de Luxe, 1915, countershaft 2-speed, in class order and fully guaranteed, complete ment; £28.—Hynes, Lismore, Ireland. [X

LEVIS, 1916, 2½h.p., single gear, 26in. wheels, tank, lamps, horn, etc., new condition; £23.— Wood, Horn Park Farm, Lee, S.E.12.

LEVIS, 2½h.p. Model E, 1916, new condition, mechanically and in appearance, at present at Palmer's Garage, Tooting, S.W. First reas offer accepted.—Letters to Burnell, Highfield S Chertsey, Surrey.

Lincoln-Elk.

RIDER TROWARD and Co., 31, 40b, 78, Hig Hampstead.—Lincoln-Elk, 1913 3½h.p. com tion, variable gear; 25 gns. (D)

LINCOLN-ELK, 1914. 6h.p., countershaft gear and chain drive, underslung coach sidecar; Halifax Motor Exchange, Horton St., Halifax.

Martin.

RIDER TROWARD and Co., 31, 40b, 78, High Hampstead.—Martin-Jap, 1914, 3½h.p. T.T., 24 gns.

Matchless.

MATCHLESS Latest War Model Combination, plete with detachable wheels, spare wheel and £120.—Exeter Motor Cycle Co., Ltd., Bath Rd., E

7h.p. Matchless Sidecar Outfit, complete with cessories, M.A.G. engine; offers wanted; insp at any time.—Grose, Ltd., Marefair, Northampt [

RIDER TROWARD and Co., 31, 40b, 78, Hig Hampstead.—Matchless 1915 8h.p. combinati gns.; Matchless 1913 6h.p. coachbuilt combinatic gns. (D)

MATCHLESS 8h.p. Combination, new, fitted J.A.P. or M.A.G. engines; extended payme exchanges.—Service Co., 292, High Holborn, L W.C.1. [

MATCHLESS, 1915, 3½h.p., 3-speed, sidecar, horn, lamps, speedometer, new tyres, new tion; £37/10.—Bruce Wood, Horn Park Farm. S.E.12.

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Fresh Light on the Fuel Question.

A NEW committee to deal with fuel matters has recently been inaugurated. This consists of extremely capable representatives both from the Institution of Automobile Engineers and from the Society of Motor Manufacturers and Traders, and the name by which the committee is known is the Fuel Sub-committee of the Technical Committee of the Motor Industries. The formation of this committee coincides in point of time with rather important events moving in the fuel world of quite a different nature. We have at various times in the past suggested that the petrol interests—in other words, the Oil Ring—have been for a long time setting a determined trap to catch all benzole produced in their own net, the ultimate object being to secure a firm corner in the motorists' fuel market. There are, of course, other indirect inducements, but this is the sum of them all. This being the case, we venture to express the hope that the new Fuel Sub-committee will do its very best to counteract these efforts of the great Petrol Ring, and, while we do not for a moment pretend that the production of benzole after the war will ever make us entirely independent of all petrol, nevertheless the more benzole we have available the less will be the extent of our dependence on our arch-enemy, the Oil Ring.

At the present time the Oil Ring is approaching benzole producers with extremely attractive offers, the sum total of which will amount to the Oil Ring taking over the whole of the benzole produced. Thus, after the war, our dependence on petrol or on the products of the Petrol Ring will be as great as ever. It has been suggested that one end held in view by the Oil Ring is that after the war, if it has control of the benzole, it will be able to mix this benzole with petrol that would otherwise be unfit for use as a motor fuel; consequently the Ring will be provided with a market for some of its products at a very much higher price than these products will otherwise command. Also, as suggested in our parent journal *The Autocar* of March 9th, it is possible that the Oil Ring is looking rather further ahead than is evident on the surface, and that it has in mind the seizure of all benzole products so as to be able to prevent the use of alcohol as a motor fuel in days to come.

The use of alcohol as a fuel has been dealt with frequently in the columns of *The Motor Cycle* and associated journals. So long ago as 1906 experiments were carried out on this subject under the auspices of *The Autocar*, and these experiments were repeated at intervals and the results tabulated and preserved for the benefit of future experimenters. It has been shown that with our present engines and carburetters alcohol is of very little value, although in a specially designed engine, with a particularly high compression ratio, it is quite efficient when once the engine is started. Mixed with benzole, however, alcohol needs no special engine nor special tuning of any existing petrol engine. It could be purchasable in practically unlimited quantities, and is entirely miscible with benzole. With these two home-produced materials very little juggling is necessary to produce an almost perfect fuel—a fuel, indeed, that has many advantages over petrol. Consequently, present war against the subtle activities of the Oil Ring is a marked step in the development and introduction of alcohol as a common fuel. There are, of course, many permanent Government restrictions to be overcome before alcohol can be permitted as a regular fuel, but we have no doubt that in the course of time these will prove to be no insuperable obstacles.

Bearing all these facts in mind, we appeal again most vigorously to the Fuel Sub-committee to do its very utmost to counteract these specious proposals. The matter is not one that admits of simple solution, but the committee will at least have the satisfaction of knowing that any sound and logical suggestions are bound to receive the support of every motorist.

An index to the advertisements in this issue will be found on the page facing the back cover

A PLEA FOR BETTER STANDS.

Some Pointed and Suggestive Remarks on a Frequently Ignored Detail of Design.

AMONGST the many points that will receive attention on post-war models, let us hope that the rear stand will come in for its fair share; it wants it.

The ideal stand should embody the following features:

(1.) Base of sufficient width to ensure the machine not falling over when set up on uneven ground.

(2.) More supporting area to be provided at the point of contact with the ground, so that the stand will not sink into soft earth, such as a field or a gravel drive.

(3.) An automatic spring up and self-locking device.

(4.) Means of lessening the effort at present required to set up a heavy machine on its stand.

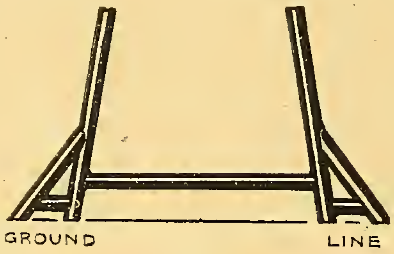


Fig. 1.

An improvement the author effected to the stand of a Douglas motor cycle.

As regards the first point: what on earth is gained by employing a narrow base such as many makers do? I have often wondered why it was done, but could see no reason at all. The fact remains, however, that many so-called high class machines possess a stand which is too narrow to support the machine safely on any but a level concrete or wood floor. I know a brand new P. and M. which tumbled over or was blown over twice while on its stand outside the owner's house; certainly the road was uneven and rather highly cambered, but so are many roads. The stand was taken off and the bottom crossbar cut right out; each leg was then bent outwards at the point where the tube joined the lug attachment to the frame, making the total base some 3in. wider; a new crossbar was then fitted and brazed in with satisfactory results.

As regards the second point. A few weeks ago I took possession of a 2¾ h.p. Douglas. This machine twice fell over when it was put on its stand on a level gravel drive. Certainly the drive was soft through the frost coming out, but drives in a thawing condition are not uncommon.

Welding the Tubing.

I took the stand off and had a piece of oval tube acetylene welded on to each leg, as shown in fig. 1. A bar of ⅝in. diameter round tube was also welded across between the old leg and the new addition; the base was thus widened and the supporting area more than doubled, for should the stand now be placed on soft ground it does not have to sink far in before the new short crossbar makes contact with the ground and carries its share of weight.

Why do manufacturers think that alterations of this sort should be left to amateurs to carry out?

It entails in every case re-enamelling the whole stand; in the case of the P. and M. this meant matching up a fancy grey-green and relining. Surely they do not think that a machine is improved by a few spills, or do they think at all, so long as they can sell their product at a high price?

A Desirable Type.

As regards point 3. Why should a rider be expected to stoop down and grasp an often muddy stand to pull it up into its place, or perform contortions with one foot to achieve the same end, and even then never be sure that the stand will stay up? One of the good points of the many on a Rudge is its stand; it invariably springs up with a welcome click as soon as the machine is wheeled off it, and once up it stays up until its rider decides otherwise. It also complies fairly well with the first two points raised—at any rate, I have ridden a Rudge for two years now, and have never had the machine topple over of its own accord. The only attention this stand ever had was a drop of oil on its pivots now and again.

Point 4 will require a bit of careful designing to carry out, but that such a device would be a great boon nobody will deny. The only way at present to get a really heavy machine on its stand is to get fairly and squarely behind it, place both feet on the stand and crossbar, and use man power. While doing this the 'bus will do its best to fall over, or, just as the weight is being brought past the dead centre, flop round will swing the front wheel, and if near a wall or near other machines will scrape its control levers or horn, or entangle them on those of an adjacent 'bus. It is really a two-man job to get a heavyweight on to its stand with the certainty of doing so without damage.

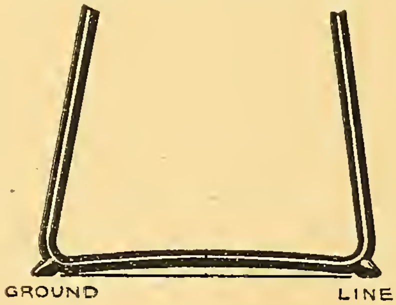


Fig. 2.

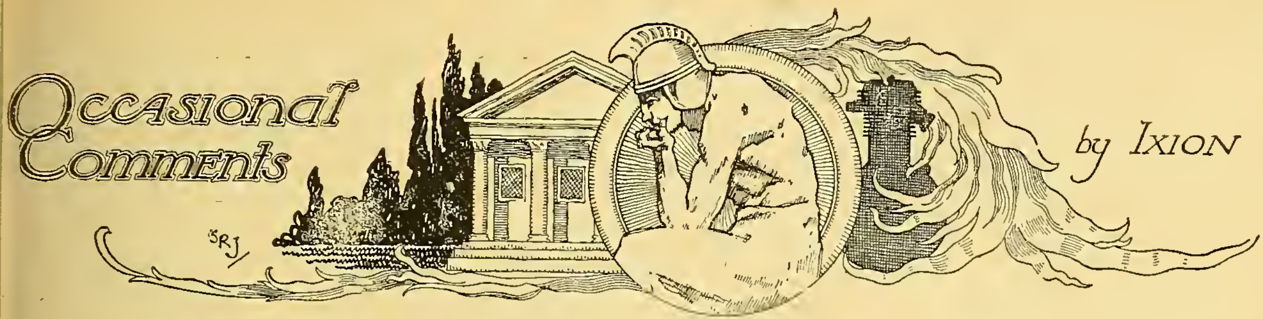
The Rudge stand—a desirable type which springs into place on wheeling the machine off the stand.

We are told that a heavy car can have all its four wheels lifted clear off the ground in seven seconds by merely turning a small handle. Why not some such device on motor cycles? The end of the handle-shaft could be brought up level with the top of the carrier, and a neat bevel or worm box housed at the bottom end of one of the rear stays.

A suitable link would then connect the cross-shaft of the bevel or worm gear with one leg of the stand so that a few turns of the handle would swing the stand up or down, according to the way the handle was turned.

A fitting of this sort would comply, of course, with point 3, with the exception that the raising of the stand would not necessarily be automatic, though a free-wheel device and spring could possibly be worked in so as to bring the stand automatically to the horizontal position as soon as it had been wound up sufficiently to transfer the weight on to the back wheel of the machine.

F.B.S.



Occasional Comments

by IXION

Riding on Rations.

IT is a merciful providence, as the parsons say, that ordinary motoring is suspended. After a day in a factory or an office, one can make shift with a shepherd's pie, or a wee fillet of fish, or an egg with cheese grated over it, the whole washed down by Government ale. But just try war rations after a hundred mile spin over the downs on a fast jigger, when there is a bit of a nip in the air. Nothing but a couple of pounds of steak and a large tankard of Bass can meet the occasion. Unlimited motoring on limited rations would have spelt red revolution within a fortnight. Sometimes I am compelled to motor on national duties. On such trips I always carry a large turbot or a pen of Rhode Island Reds in full lay on the carrier. Even these precautions fail to satisfy my road appetite, so that I gaze at plump flappers with a cannibalistic gleam in my hungry eye.

The Conversion of a Nation.

SO far I have held my peace in the controversy as to whether my proprietors are justified in preparing for a German trade boycott after the war. The matter strikes me thuswise. It is folly to distinguish between the German Government and the German people until the Government is disowned by the people. It is equally folly to distinguish between the German army and the German nation, for the army *is* the nation, and has been so for many long years: this in a very special sense, seeing that German women are as a class quite extraordinarily docile, and subject to their husbands. My definition of our war aims is that we are fighting for the conversion of the German nation: civilisation will not be safe until a radical transformation of the German national character and ideals is evident. It is very doubtful whether the war will effect this: war may begin it, but the aftermath of the war, and a slow aftermath at that, may be left to complete it. Germany possesses extraordinary trading genius. She cannot invent, but she can copy and improve, she can manufacture scientifically and economically, and she knows better than any other nation how to extend her own trade, and to capture the trade of her competitors. If she be granted free trade before she is converted, she will become colossally rich within a very few years of the signing of peace. She would, if unconverted, employ her wealth to prepare another war. This next war would very possibly be cheap and rapid, and decided largely by a surprise attack from the air. That is a risk to which civilisation shall not be subjected with my consent: and therefore I am a whole-hogging anti-German until such time as unmistakable proofs of the conversion of Germany are offered me. If I had a pet tiger cub which had manifested a fancy for human blood, I would keep it caged until irrefragable evidence proved that I could safely loose it again.

The Camera and Bumps.

W. G. ASTON showed me some months ago several interesting photographic records of spring efficiency which he had taken, and as an American engineer reports similar experiments, the embargo on publicity is now removed. Mr. Aston attached small electric lamps to various parts of a car, and photographed it being driven over prepared bumpy surfaces by night. The resultant print consisted of a dark background crossed from side to side by a number of wavy white lines, which showed the height of each bump and the periodicity of each wave. Incidentally, by attaching lamps to various parts of the car, it was possible to tell what contribution was made to the net total insulation by the tyres, the springs, the rubber buffers between frame and body, the upholstery, and even the passengers' seats, and also to decide whether the front seats were really better sprung than the back seats, not to speak of whether a fat man motors more smoothly than a lean one. Here is a magnificent opportunity for the A.C.U. When the war is over, friend—or should I rather say "Major"?—Loughborough should organise *instanter* a trial of motor cycle front forks and rear springing. It can easily be arranged to cover a great variety of rough surfaces, a full range of speeds, and all loads from the minimum to the maximum. The eternal problem of motor cycling may then be solved, which, of course, is whether the X —— fork is an unspeakable dud or a brilliant invention.

What Hope for our Roads?

THE above suggestion is the more opportune as our roads have probably gone west for my lifetime at any rate. Various credulous optimists suggest that umpteen millions will be available for road expenditure as soon as peace is signed, but these fatuous gentlemen are crassly unaware of the tickets which sundry politicians from labour upwards (or downwards?) then intend to produce, and of the millions involved in these often visionary schemes. My own idea is that funds may just be available, if we get a decent peace, to repair our war-worn highways to some semblance of their former selves, whereupon a vastly increased motor 'bus and lorry traffic will immediately corrugate them afresh. More efficient forks and universal rear springing are essential to my dreams, and I look to the A.C.U. and the Aston camera-graph to co-operate in that noble work.

TWELVE MONTHS WITH A JUNIOR TRIUMPH.

A Cornishman's Experiences with a Two-stroke in his Home Country.

THIS short contribution is not intended to lay a thick veneer on a 2¼ h.p. Triumph, it is rather to be a fair description of a novice's first attempt at motor cycling—including its vexation and its happiness.

My first essay at motoring was the humble Auto-wheel fixed to a Gamage cycle, which combination I rode several months. An attack of rheumatic fever compelled me to give up severe exertion, which was imperative with an Auto-wheel round these parts, and I had to look for another mount. I decided on a two-stroke Baby Triumph.

My first ride was a succession of nervous fears; every stone seemed to come straight for me, pot-holes seemed endless, and to get from the side of the road to the higher middle a nightmare.

This state soon passed, and the joy of speed was upon me. I thought, "No more push-cycling for me."

A fortnight after this I began to take an interest in the mechanical side of my mount. I wondered how the explosions occurred in the crank case. I had been told quite seriously by a motor cyclist of some years' standing that to two-stroke meant that one charge was fired in the cylinder and the other in the crank case. But I could only see one plug. This made me think for myself. I soon decided that what really happened was that, although the mixture was drawn into the crank case, it was not fired there but in the cylinder. "But how?" I asked myself. I then took off the cylinders, and the situation was revealed to me, *i.e.*, the transfer port.

The author with the 2¼ h.p. Baby Triumph on which he gained his first knowledge of two-strokes.

A letter to the Editor of *The Motor Cycle*, with a stamped envelope for reply, confirmed my idea.

The Mystery of "Timing."

Ignition next claimed my attention. "Why did the spark occur at the right time, etc.?" I enquired, and was told it was due to "timing," and it was carefully impressed on me never to interfere with my magneto. However, I heard the chain rattle one day, and I took it off to tighten it. It was too badly stretched, so I bought a new one. How to get the timing right was the next thing.

Out came the Triumph booklet, and I read that by placing the arrow on the flywheel dead upright, and the piston at the top of its stroke, with the magneto control fully retarded and the platinum points just breaking, the spark would jump across this gap at the proper time. I carefully carried out the instructions, and, replacing the chain case, wheeled the machine on t the road, and, hurrah! it fired.

Petrol Consumption.

Some days afterwards, on comparing my mileag with the petrol consumption, I was surprised to fin I was getting only sixty-four miles to the gallon. Th only things, as a novice, to which I could attribut this poor result were a badly slipping belt and leakin tank. I carefully checked these things, and to m idea they seemed quite all right. Well, then, it mus be the carburetter. Taking off the lid of the floa chamber, I discovered the needle had worn badly. I therefore procured another one and fitted it.

Things were a littl better, but not much so off went anothe letter to the Edito with the stampe addressed envelope fo reply, and he suggested lowering th petrol level. I carefully examined the je and taking out th needle from the floa chamber. I gentl tapped the collar upwards. On giving th machine another tria I found I could ge 98 miles to the gallo of petrol. Not quit satisfied with this tota I had recourse t other methods. bought a quart o Prices' Huile de Luxe, tried one pint of paraffi to the gallon of petrol, used full air, instead of ai lever close to the throttle as previously, and found had more power and could get 103 miles to the gallon Beyond this total I could not get.

The First Tour.

I now had enough confidence to start on my firs tour, and, like most novices, to me it was anothe "milestone." Starting from Penzance my route la through Redruth, St. Columb, Wadebridge, to Tintagel, with a slight deviation to visit Newquay. Thi town is a rising watering place.

Arthurian Legends.

To resume, most people will have read or hear about the legends of Tintagel as told in Tennyson' "Idylls of the King," and of which there is muc supporting evidence. King Arthur and his knight built a castle here, and there are still several ruine walls standing on an island. About the centre of th island is a small roofless chapel, with rude stone seat and a slab of stone as the altar. Services are still hel once yearly.

welve Months with a Junior Triumph.—

Leading down to the sea stone steps were cut into he rock which are supposed to have been made as an mergency exit in case a besieging force became too nterprising. A drawbridge used to connect up with he mainland, and the roaring sea beneath made it lmost impossible for foes to get across. On the nainland side of the bridge is "My Lady's Bower." t is composed of very thick walls with small peepholes and windows all facing seawards. What appened to the ladies when the enemy appeared is ot mentioned, but presumably they, too, were withdrawn to the island fortress.

Battle Fields.

In the village of Tintagel there still remain some xquisite examples of Saxon architecture more or less n decay, but generally incorporated with a more nodern building. A large hotel now faces the Atlantic, and has taken off the romance of Tintagel omewhat.

The next stage is Launceston, through Camelford. On the way the site of the battle between King Arthur nd his traitorous nephew, Modred, at Slaughter Bridge, A.D. 543, is passed. In places it is rough going, hilly, etc., and the roads are badly cut up by he traction engines hauling timber. After visiting the church—which, by the way, is beautifully carved—also he ruins of the Norman castle, the front wheel is urned homewards through Bodmin and Truro. At he former place a most bloody battle was fought luring the civil war, and many minor engagements vere fought on the moors.

There is nothing of importance to be seen at Truro xcept the cathedral, which is a modern structure. From the market-place the left turning is taken, and after some bad hills have been negotiated Helston is reached.

The most noteworthy happening here is Flora Day, held annually on the 8th of May. All the lads and lassies dress themselves in flowers and dance in and out of the houses. From Helston to the Lizard is eleven miles over a good road.

(Top) A Cornish scene. Ancient stone crosses such as shown are found in all parts of the county.
(Bottom) The "First and Last" refreshment house at Land's End.

Serpentine Stone.

When so near Kynance Cove a point should be made of visiting it. Here the local stone known as Serpentine stands out of the sea in most curious forms, and the colouring is so beautiful that it well repays the little trouble walking down to it. I now turn back through Helston and Breage to Marazion, where the best view of St. Michael's Mount is obtained. It can be visited at low tide.

From Marazion to Penzance is three miles, and the whole of the journey approximately 225 miles.

Many such trips were taken on the 2¼ h.p. Triumph, which, beyond a little overheating one very hot day, gave very little trouble.

Writing on overheating reminds me how a good Samaritan (?) came to my aid. I was letting the engine cool down a bit when he passed me on a powerful combination. On seeing me walking the machine about with the exhaust lifted, he stopped and came back to see what was the matter. I was just in the act of putting the stand down, the spring mudguard being rather tight, when he said, "Allow me," at the same time giving a savage kick which smashed off the stand completely. He turned round, started up his own outfit, and was gone. That is the last I saw, or wanted to see, of that Samaritan.

During the twelve months my total mileage was 2,300, and expenses £12 9s. 1d., composed of items as follows:

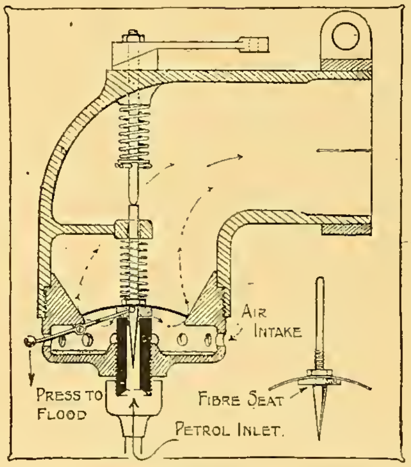
Petrol	£4	0	0
Oil		10	0
Accessories and repairs	6	4	1
Licences, including two petrol permits ...	1	15	0
	£12	9	1

The item accessories and repairs may seem rather high, but it includes a new tyre, belt, chains, piston rings, etc. Against this can be put down no loss through depreciation, as, having had constant renewals, I was able to sell the machine for the same as I gave for it. W.H.L.

THE MACHINE FOR THE MULTITUDE

Some Notes on the Post-war Market, and a Suggested Simple Carburetter Design.

THERE is no doubt that, when things have become normal, a great effort will be made to provide a motor cycle for the multitude, and keen will be the competition among manufacturers of cheap and inexpensive machines. Naturally, we look to the light two-stroke to satisfy the bulk of this demand. It is the only efficient type of mount which can be sold at a popular price without serious detriment to its efficiency. We have, in the past, seen various efforts to produce a cheap 3½ h.p. single-cylinder machine, and the less said about these efforts the better. The two-stroke is essentially the mount for the multitude, and there is no particular reason to conclude that it will necessarily retain its present diminutive dimensions.



A carburetter designed by "Chinook." The main feature is its simplicity, which will enable it to be produced cheaply.

Most of the small two-strokes at present on the market are very sturdy pullers, and do not overheat when abused. I have heard of remarkably good results having been obtained with these little machines fitted with light sidecars, and could quote numerous long and fairly arduous tours that have been thus completed, the machines having a two-speed gear, of course. Realising the possibilities in this direction, one or two firms are going all out for the featherweight sidecar outfit after the war, and this with perfect confidence as to the results they will achieve. All they are at present looking for is a lightweight three-speed gear box, which will doubtless make its *début* in due course.

To most riders of long experience the two-stroke in itself is an affliction, to say nothing of a two-stroke with sidecar attached, yet I myself am very sanguine as to the future of the lightweight outfit. The two-stroke engine behaves better under adversity in the way of overloading than any four-stroke.

Towing a Big Twin.

I well recollect on one occasion towing a 7 h.p. twin and sidecar for miles with a little Velocette, which, naturally, was run on low gear all the way, and which showed not the slightest tendency to overheat, whereas I have, on more occasions than one, caused much larger four-strokes to overheat in two or three miles under similar conditions. Also it must be borne in mind that the multitude is no connoisseur; so long as a machine will rev. itself out into the country and carry two rather further and faster than pedal-cycles, so long as it will climb anything within reason on its low gear, and can be depended upon for getting there and back without trouble, and, above all, so long as it is cheap, the multitude will throng to purchase it.

As for the certainty of a good market, almost every soldier who comes home on leave is determined to possess a motor cycle after the war, while thousands of munition workers have money laid by for that purpose. Wise is the firm that has its after-war campaign clearly cut and dried.

Simplicity Essential.

Hitherto no genuine effort has been made to produce a machine of absolute simplicity. The magneto is, of course, inevitably a costly instrument, and it would be unwise to attempt economy here. A lightweight three-speed gear box might be quite easily produced, and there is no reason whatever why a high-priced instrument in the present-day carburetter should be used.

Here, indeed, is unlimited scope for the inventive genius. There is no doubt whatever that a perfectly good and efficient carburetter could be made for 8s. or 10s., and such an instrument, after the war, would sell by the thousand. There is no reason why a carburetter should have more than one accurately machined part, such as, for example, the suggested design on this page. It consists merely of a tapered needle accurately machined to fit its jet, and held down thereupon by its own weight and a light hair spring—a fibre collar being fitted to take the hammering effect and provide a petrol-tight joint. Mounted on this needle is a thin aluminium mushroom, past which the total air supply is drawn, so that the suction of the engine tends forcibly to lift the tapered needle from its seating. The higher it is raised the more petrol is allowed to pass the jet, and the more air is allowed to pass the mushroom, so that the working could be (if desired) perfectly automatic. Control is effected in the simple manner shown by determining the amount of lift possible for the reciprocating needle.

I do not hold up this arrangement as ideal, as each designer has his own ideas, but merely as illustrating the simplicity possible in the case of one single fitment for the machine for the multitude—no float chamber, no pistons or barrels, and the very simplest type of control mechanism. Several different sizes of needles with or without discs could be stocked, of course.

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FREE ON REQUEST

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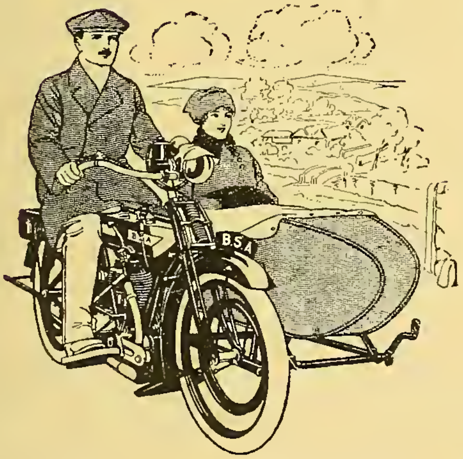

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For Solo & Sidecar

THE BIRMINGHAM SMALL ARMS COMPANY LTD.,
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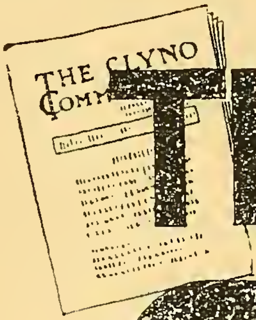

The Post War CLYNO

has been evolved by practical Motor Cyclists who are also experts in production.

Of its many exclusive features we shall speak in our next announcement—

In the meantime note that it is characterised by an unequalled Reliability and Power—

That silence in running is assured—that the comfort of both passenger and driver is luxuriously provided for and—

That its "get-at-ability" is entirely exceptional—

Are you interested?—then write us.

CLYNO ENGINEERING CO.,
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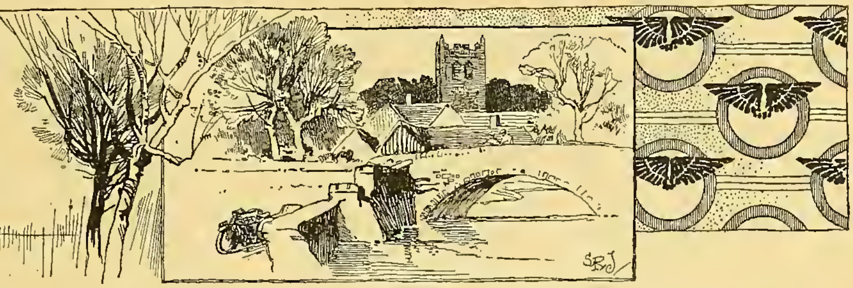


A Short Discussion on the Various Forces which cause a Motor Cycle to continue in its Course. By "Mohandis."

WHEN I innocently chose the steering of a bicycle as an example of centrifugal force in my recent articles on "Mechanics," I had no idea that I should tap such a stream of correspondence. Many of the letters have been extremely helpful, while some opinions were clearly unsound; but, as the advantage of the Correspondence column is that neither the Editor nor his contributors are to be held responsible for the views expressed therein, I have not thought it necessary to question statements with which I could not agree. There has recently appeared an article on the subject of bicycle balancing, however, which does seem to call for some comment; I refer to Mr. W. Arthur Jones's remarks on "The Dynamics of Bicycle Locomotion" in the issue of January 31st. As far as I can gather, the gist of this article seems to be that, whereas a bicycle at rest is in a condition of unstable equilibrium, yet as soon as the machine begins to move it instantly acquires some mysterious kind of "inherent stability." Whether intentionally or not, I cannot say, but the writer certainly gives the impression that the rider is not called upon to take any part whatever in the control of the machine—all he has to do is to trust to its "dynamic equilibrium." The obvious inference is that a sack of potatoes could ride a bicycle just as easily as a human being.

Gravity and the Straight Path.

Mr. Jones makes no attempt to explain what, after all, is the core of the matter; that is, how it is that the cyclist is able to frustrate the ceaseless efforts of gravitation to bring him to earth. That is the problem which is always so puzzling to the uninitiated, and which it is the purpose of the present discussion to solve. The explanations that have so far been offered are (1) centrifugal force, (2) "shifting the point of support," and (3) gyroscopic action. But Mr. Jones categorically sweeps all these on one side, and asserts, in effect, that the bicycle just balances itself. Should it depart from its straight path by even an infinitesimal amount, an infinitely great force comes into operation to push it back into the ways of righteousness. The fatal flaw in this argument is that the one thing a bicycle will *not* do is to travel in a straight path; for, if the cyclist's equilibrium is once disturbed (and it is in a state of constant disturbance), his only hope of regaining his balance is by temporarily *abandoning* a straight course. Otherwise why should he require to give incessant impulses to the handle-bar?

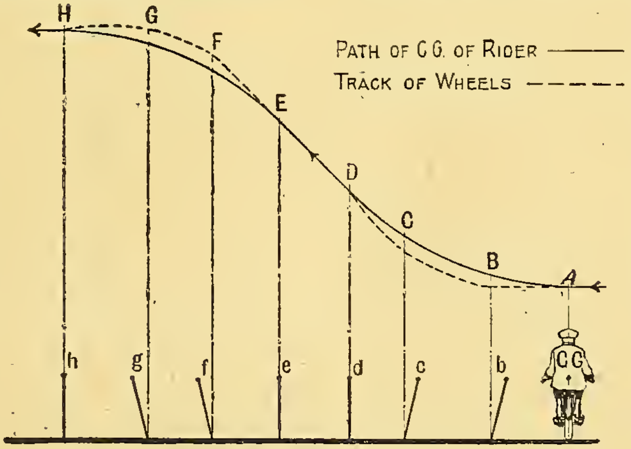


Fig. 1.—Diagram of an exaggerated "wobble," showing how a cyclist loses and regains his equilibrium. The upper curves represent the cause of the operation in plan, while the lines beneath show the rider's inclination to the vertical at various stages.

Cornering.

As for the opinions on cornering expressed in the article in question, they are frankly beyond me. I have absorbed a reasonable quantity of rigid dynamics—that "very difficult subject"—in my time, but when I read of "forces peculiar to the bicycle," and of centrifugal force only increasing the banking "slightly," I can only conclude that I must have studied a different brand of rigid dynamics from that favoured by Mr. Jones. My own views on cornering agree absolutely with those of a correspondent signing himself, very aptly, "Mathematician" (January 24th). In the original articles on "Mechanics" I was under a sort of self-denying ordinance to eschew the use of mathematical symbols, otherwise my explanation of cornering would probably have forestalled this correspondent's almost word for word. While here expressing my especial thanks to "Mathematician," I should like to refer particularly to the last paragraph of his letter. The point here raised, that centrifugal force is really a sort of inertia, is one that I endeavoured to lay special stress on in the third instalment of the "Mechanics" series. Inertia, in the ordinary sense of the term, is the resistance that a body offers when *linear* acceleration is impressed upon it; centrifugal force is the resistance—a reaction of precisely the same nature—that the body offers when *radial* acceleration is impressed upon it.

Before proceeding to make a few further obser-

The Bicyclist's Equilibrium.—

vations on the subject of the cyclist's equilibrium, perhaps I ought to say that I am sorry if, through ignorance or dulness of comprehension, I have done Mr. Jones injustice; but as at present his article appears to me to be misleading, I thought it necessary to dissociate myself from his opinions in the way I have done. Now the starting point of any discussion on the theory of the stability of single track vehicles must be the fact, which no one except Mr. Jones has questioned, that such a vehicle invariably progresses in a series of more or less pronounced curves or wobbles. Let us, therefore, endeavour to trace the life history of a wobble, and for the sake of clearness we will consider a well-developed specimen, such as would be generated by a learner in the art of balancing. The accompanying sketch is an attempt to represent the state of affairs at different stages of the proceedings. The upper curves show, in *plan*, the paths taken by the rider's centre of gravity and by the wheels; while the lines beneath are intended to be *rear* views of the cyclist. At point A we will assume that the learner has momentarily succeeded in maintaining his equilibrium; he will therefore appear to an observer stationed in the rear to be upright, as shown in the small view below A. As the bicycle proceeds from A to B, however, it begins to gravitate towards the right, and as the rider is too inexperienced to apply at once the necessary correcting impulse, he finds himself at B with quite a considerable list to starboard, as indicated by the sloping line *b*. Realising at this stage that prompt action is called for to avert a spill, he turns the handle-bar so as to steer to the right, with the result that the arc BC is traversed. Although this manœuvre, by calling into play centrifugal force to neutralise the effect of gravity, has prevented any further declination from the vertical, the rider has still to regain his vertical position. Accordingly, at C, he turns the handle-bar still more, thus reducing the radius of the arc along which the cycle is travelling. The influence of gravity acting through *c* now becomes insufficient to impress on the rider the increased radial acceleration necessary to make him traverse the smaller circle—*i.e.*, centrifugal force overcomes gravity, and the machine rights itself, as at D.

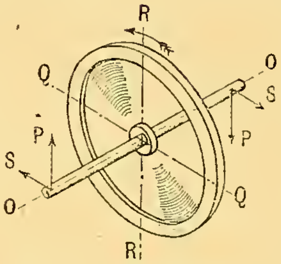


Fig. 2.—Illustrating the principle of gyroscopic action Owing to the effect of precession, the forces P P cause the ends of the spindle to move in directions S S.

Direction.

The learner has now regained his equilibrium, but he has lost his direction, for he finds himself heading along the line DE for the ditch at the side of the road. A further series of operations, as shown at F, G, and H, is therefore required before he once more resumes his original course. Now I do not pretend for a moment that my sketch is anything but a diagram of a diagram, so to speak. For one thing, the two wheels do not follow the same track, as I have shown them to do. Actually, of course, the back wheel always "cuts off the corners," and thus very definitely assists in bringing the points of support under the centre of gravity. Also, needless to say, the actual course of a wobble is not such a smooth and well-conducted business as is indicated in the diagram. Still, the rider's c.g. has unquestionably travelled in a curved path, and therefore centrifugal force has infallibly come into play. It is really only a question of terminology as to whether centrifugal force or "shifting the point of support" plays the greater part in balancing. The rider has undeniably regained his balance at D by steering in such a manner as to bring his point of support beneath him, but he could not have done so without the aid of centrifugal force. On the other hand, as a correspondent, "Allied," has shown in his letter of January 24th, that a bicycle can be balanced without the aid of centrifugal force, provided that special arrangements are made. To quote again from my good friend "Mathematician," centrifugal force is merely "a measure of the tendency of a body to refuse to move in a circle"; if there were no such tendency it would be futile for our learner to steer in a sharper circle at C in the figure.

Gyroscopic Action.

The part taken by gyroscopic action in balancing a bicycle at high speeds is so interesting that a little further explanation of the matter may not be out of place. The accompanying figure will give an idea of the principles involved. The wheel shown is imagined to be revolving rapidly about the axis OO. If vertical forces PP are applied to the ends of the spindle it would naturally be expected that the wheel would tend to tilt about the horizontal axis QQ, but what actually happens is that the tilting takes place about the *vertical* axis RR. In other words, the ends of the axle move horizontally in the direction of the arrows SS. This is the phenomenon known to physicists as "precession," and it is the fundamental principle embodied in all types of stabilising apparatus which employ the gyroscope. Examples of its action are very common—there is that popular toy, the gyroscopic top; then we have the motion of an ordinary peg-top; the earth also is subject to "precession," hence the astronomical term, "precession of the equinoxes"; but the most striking instance for our present purpose is that mentioned by a correspondent "G.R.B." If a cycle wheel be spun as shown in the figure, and the couple PP be applied to the spindle, the spindle will manifest a violent disinclination to follow the direction of the forces, but it will instead whip round horizontally.

Now the interesting point is this: if the cycle wheel be revolving along the road instead of between the rider's fingers, the effect of precession is to influence the steering in precisely the manner required to balance the bicycle. Thus, if the cycle heels over to the right, this will bring forces to bear on the wheel spindles exactly corresponding to the forces P P in the diagram. Consequently both wheels will tend to veer round to the right, as indicated by the arrows S S. The front wheel, being free in the steering column, is quite able to obey this impulse. Further, all bicycles are constructed in such a way that a right hand couple applied to any part of the machine causes the front wheel to swivel to the right. (This is easily demonstrable:

80 Generals and Admirals!

Impressive Facts about "Pelmanism."

THE remarkable extent to which the new movement—Pelmanism—is being adopted by officers and men affords impressive reading.

There could, indeed, be no finer or more convincing evidence of its intensely *practical* value than the fact that over 20,000 British officers and men (Naval and Military) are studying it whilst on active service. This includes 80 Generals and Admirals! All correspondence being confidential, no names can, of course, be published.

From time to time the announcements made by the Pelman Institute have included some of the more interesting letters from officers at the Front or with the Grand Fleet, giving more or less precise particulars of the direct benefits accruing to them from the adoption of Pelman principles. Promotion, distinction, increased efficiency, a keener zest for work: self-confidence, individuality, judgment, decision: a perfect memory (most valuable of qualities in this super-scientific war), concentration—these are some of the benefits daily recorded. Small wonder that a distinguished General writes that "the value of the Pelman Course can hardly be exaggerated." His letter, with others of special interest, will be found below.

Business and professional men are equally appreciative. The benefits of Pelmanism are so clearly apparent (and so invariable) that scepticism and prejudice have vanished. The facts recorded, *by students of the Course themselves*, dispose of all doubt or question as to the value of "Pelmanism."

If there is a reader of *The Motor Cycle* who has not yet received a copy of *Mind and Memory*, in which the principles of Pelmanism are explained at length, and in which a full synopsis of the Course is given, he (or she) should write for this *brochure* to-day. It will be sent, *gratis and* post free, together with a full reprint of *Truth's* outspoken report on the work of the Pelman Institute, upon application to the address given at the foot of this page.

A Distinguished General's Verdict.

One of the most emphatic endorsements that the Pelman Course has ever received comes from a distinguished General with the B.E.F. He says:

> **"The value of the Pelman Course can hardly be exaggerated. I agree it should be nationalised."**

Following upon the remarkable letters recently published, in which Colonels, Majors, and Captains (both Army and Navy) have attributed their promotion, *and, in some cases, their distinctions*, to Pelmanism, the General's pronouncement is of special significance.

For the benefit of those readers of *The Motor Cycle* who have not already seen the letters referred to, they are reprinted here.

"The Unsoldierlike Sub."

The first is from a Captain with the B.E.F. We give his letter in its entirety:

> "I should like to call your attention to the facts of the story of my Pelman Course.
>
> "When I began I was looked upon with disfavour by the C.O. of my battalion at home as being a sleepy, forgetful, and unsoldierlike sub. When I began your Course my star began to rise—I had the ability, but had not been able to use it. I left the home battalion with my C.O.'s recommendation as being the best officer he had had for more than a year, and came to France.
>
> "I was then appointed as a second lieutenant to command a company over the heads of four men with two 'pips,' and have now three stars and an M.C.
>
> "That I was able to make use of my abilities so successfully I attribute entirely to the Pelman System."

That his is not by any means an isolated case is shown by the next letter, which is remarkable for its brevity. It is also from a Captain, who, in response to the question, "What have you gained from Pelmanism?" replied:

> **"Three Stars,**
> **A Military Cross, and**
> **A Clearer Head."**

Another officer suggests that the announcements made by the Pelman Institute err on the side of modesty. He writes:

> "One great point in favour of your System which, if I may say so, you do not make enough of in your advertisements is the cumulative benefit accruing.
>
> "As far as I can see, once having got on the right track and rigidly following the System, there should be no limit to the ultimate mental capacity obtained."

Each letter supplies its own adequate comment. Take the epistle of a Lieutenant-Colonel, who, writing from Salonika, says:

> **"As a direct consequence of Lesson Two I have got a step in rank."**

Similarly, a Major attributes his promotion *and his D.S.O.* to Pelmanism; the Captain of a fine cruiser thanks Pelmanism for his command, having been promoted by selection over the heads of senior officers!

There is, in fact, a bewildering mass of direct personal testimony to the value of the Course from every rank and from every unit of the British Army and Navy.

It is not always promotion that is the object of those who take up the Pelman Course. Here is a letter which presents another phase:

> "The Course has prevented my becoming slack and stagnating during my Army life—this is a most virulent danger, I may add. It inculcates a clean, thorough, courageous method of playing the game of Life—admirably suited to the English temperament, and should prove *moral* salvation to many a business man. 'Success,' too, would follow—but I consider this as secondary."

Easily Followed by Post.

To the uninitiated it may well appear impossible that such remarkable results can be attained in a short time as a consequence of half an hour a day for a few weeks spent in studying lessons. Yet it is the bare truth, and it should help readers to realise what a tremendous force for personal betterment "Pelmanism" is.

As a reader of the Course recently wrote: "If people only knew, the doors of the Pelman Institute would be literally besieged by eager applicants."

Following the intensely interesting lessons and exercises the students of Pelmanism rapidly develop a brilliant Memory, strong Will Power, complete power of Concentration, Quick Decision, Sound Judgment, an ability to Reason clearly, to Converse attractively, to Organise and Manage, and to conduct their work and social duties with Tact, Courage, Self-confidence, and Success. All mental weaknesses and defects are, on the other hand, eliminated—such as Mind-wandering, Forgetfulness, Weak Will, Aimlessness, Bashfulness, Self-consciousness, the "Worry Habit," etc.

Over 250,000 Men and Women.

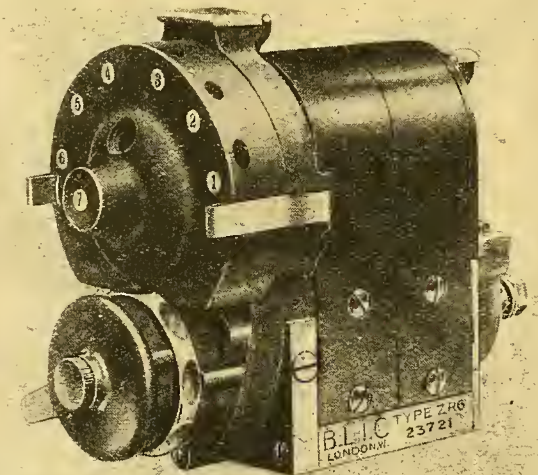
The Pelman Course has already been followed by over 250,000 men and women. **It is directed through the post, and is simple to follow.** It takes up very little time. It involves no hard study. It can be practised anywhere, in the trenches, in the office, in the train, in spare minutes during the day. And yet in quite a short time it has the effect of developing the mind just as physical exercise develops the muscles, of increasing your personal efficiency, and thus doubling your all-round capacity and income-earning power.

A full description of the Pelman Course is given in *Mind and Memory*, a free copy of which (together with *Truth's* special supplement on "Pelmanism") will be sent post free to all readers of *The Motor Cycle* who send a postcard to The Pelman Institute, 199, Wenham House, Bloomsbury Street, London, W.C.1.

B·L·I·C

The British-built Magneto with a record behind it.

RENOWNED for Reliability and Efficiency, its performances under war conditions have served to perfect the sterling qualities of the "B.L.I.C." MAGNETO, and to-day it stands supreme amongst magnetos—whether British or foreign.



ASSOCIATION OF BRITISH MOTOR AND ALLIED MANUFACTURERS

THE BRITISH LIGHTING AND IGNITION CO., Ltd.,

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The Bicyclist's Equilibrium.—

stand at the right-hand side of your machine; push the saddle away from you with your left hand, and pull the top tube towards you with the other hand; the front wheel immediately swings round to the right.) We see, then, that the couple induced in the back wheel by the effect of precession also does its share in turning the front wheel to the right. In brief, if the bicycle tends to fall to one side or the other, gyroscopic action comes into play and tends to turn the handle-bar in a direction which will enable centrifugal force to right the machine *in just the same manner that the rider does.* The higher the speed, the greater the gyroscopic action, hence the smaller the effort required from the cyclist. In a motor cycle, of course, the engine flywheel adds its quota to the effect produced by the road wheels.

The Mind of the Rider.

There is just one other correspondent to whom I wish to refer, and that is "Top Heavy." I like the tone of his letters very much, and I should be sorry to leave him with the impression that he and I are at variance on any material point. Our little difference of opinion hinges solely on the question of what are, and what are not, to be considered as forces. When I was writing as the author of articles on mechanics, which is the science of strictly physical forces (among other things), I naturally had to rule out of account such things as mental and nervous forces; but now that I am trying to discuss the whole general question of the cyclist's equilibrium, I can cordially agree with the point of view expressed by "Top Heavy" in his letter of January 31st, viz., that it is the *mind* of the rider, and his personality generally, which is the controlling and the only really indispensable partner among the varied company of forces and influences that unite to keep him off the ground.

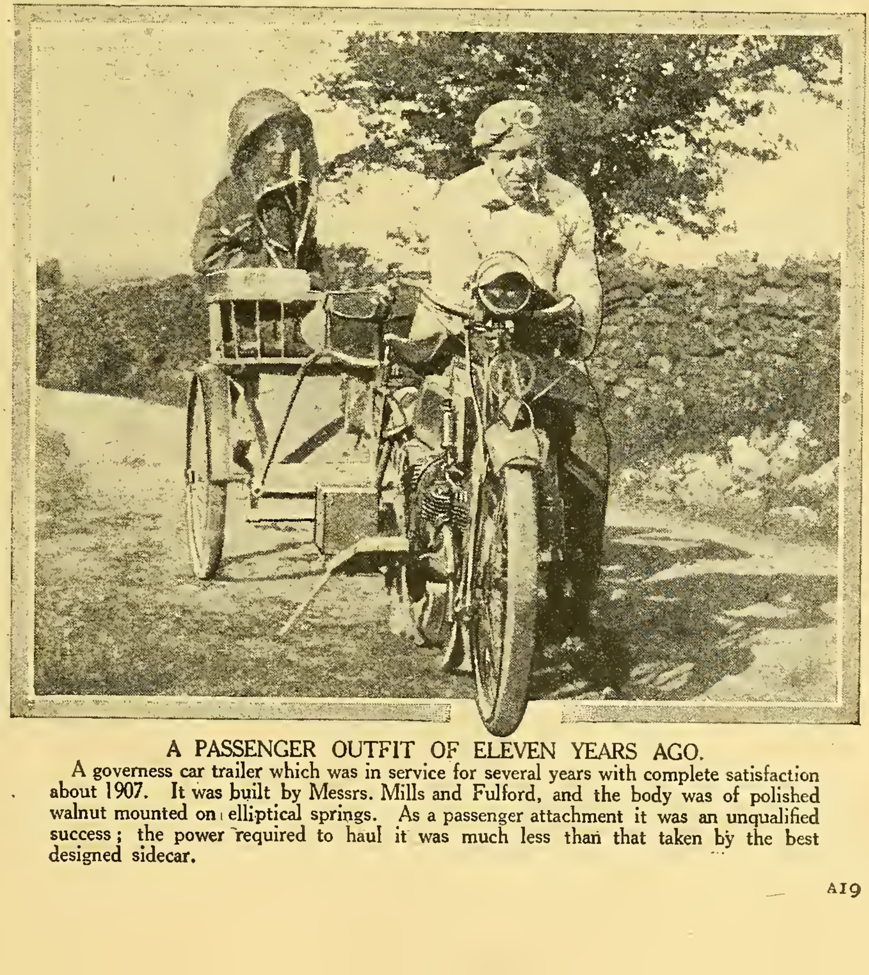
Although this article is intended to have the effect of oil on troubled waters, there is a possibility that it may have a contrary action, and serve instead as fuel for further controversial fires. It it does, I should like to make the following suggestion. This problem of the bicyclist's equilibrium is one that must have been threshed out scores and scores of times already. The publication of these researches would be of service, I think, to *The Motor Cycle* readers. [We propose to publish such conclusions in the near future.—Ed.]

ABOUT SPARKING PLUGS.

Does the Position of the Plug in the Cylinder affect the Power?

A READER is suffering from sparking plugs which automatically widen their sparking gap in use, and of one plug he states that in a single long run it will extend its gap so fast that towards the end of the run the spark can no longer jump the gap. I had better leave this question to the experts, but the plug in question must be uncommonly bad. Either the metal becomes partially fused at the tips of the electrodes so that their length actually is abbreviated, or else the electrodes wilt under the heat and the lower electrode droops away from the central point. The same correspondent advances a theory that on his two-stroke machine better combustion is obtained when a single gap sparking plug is so mounted that the gap is on the upper side of the plug, the plug being screwed into the side of the cylinder and not into the head. I find it difficult to believe that any appreciable difference in running could result from raising or lowering the spark position by a quarter of an inch in the cylinder; but I state the point in case any authority can settle it. I have never assured myself that a perceptible difference resulted from using a plug in the cylinder head or cylinder wall, and, if the latter, on the side adjacent to or remote from the inlet valve; but people who have conducted precise scientific experiments may be able to clinch the point.

ROAD RIDER.

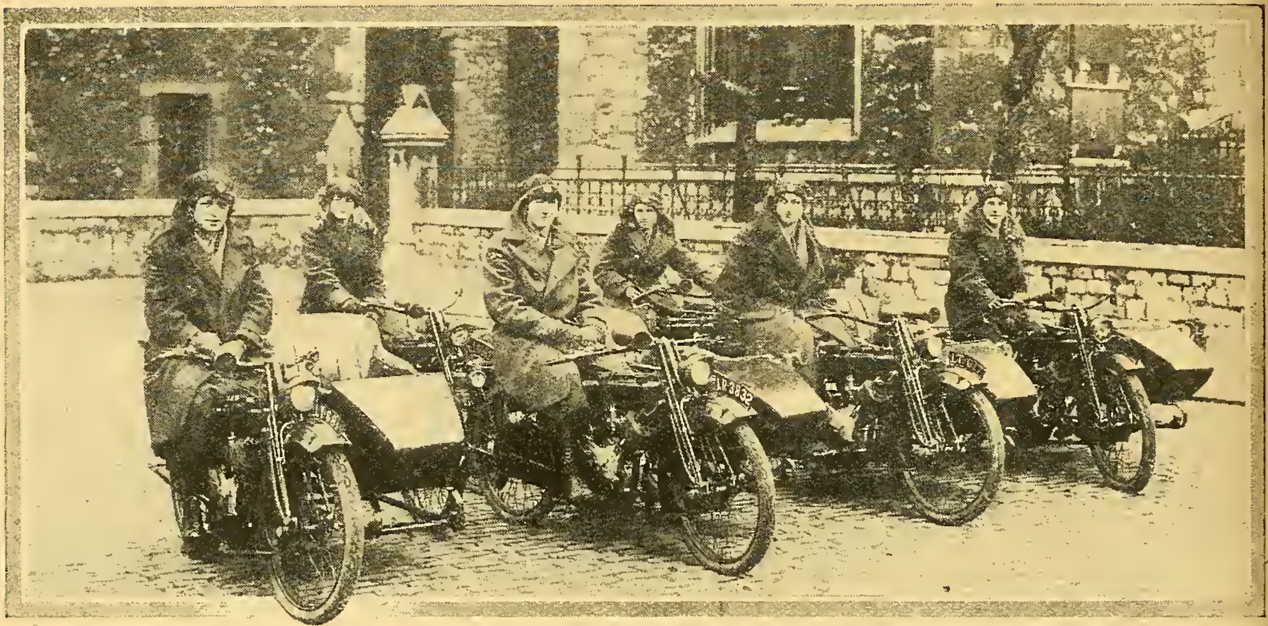


A PASSENGER OUTFIT OF ELEVEN YEARS AGO.

A governess car trailer which was in service for several years with complete satisfaction about 1907. It was built by Messrs. Mills and Fulford, and the body was of polished walnut mounted on elliptical springs. As a passenger attachment it was an unqualified success; the power required to haul it was much less than that taken by the best designed sidecar.

Lady Motor Cyclists in the British Army.

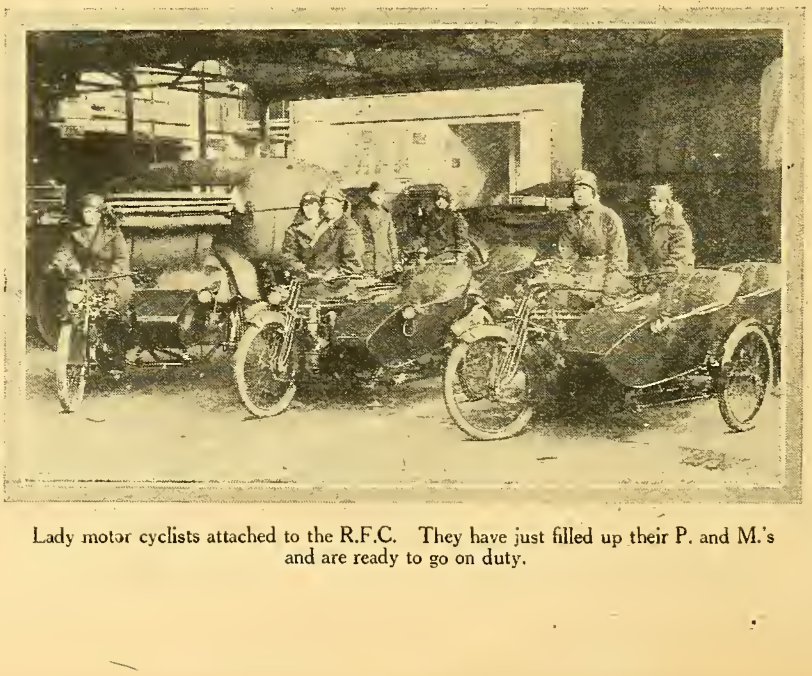
A Glimpse of the Work of one of the Sections of the Women's Legion.



A group of the R.F.C. lady motor cyclists.

MENTION of lady motor cyclist despatch riders attached to the British Army has been made from time to time in these pages. Thanks to the courtesy of the Transport Department of the Air Ministry and of the officials of the Women's Legion, we are able to reproduce some photographs showing a few of these women who are so contentedly doing men's work, and to record a few facts concerning their duties. The Women's Legion (Motor Drivers' Section), under the direction of the Commandant, Miss Christabel Ellis, O.B.E., accepts recruits for despatch riding for both the A.S.C. and R.F.C. Motor Transport Sections. A reference was made to this splendid body in the issue of the 28th ult., in which a letter from its president, Lady Londonderry, was quoted.

The section is under the direct control of the War Office (Q.M.G.3), which has compiled a complete set of regulations issued with Army Orders. Despatch riders on probation receive 25s. a week, and when duly qualified 35s. a week. After a month on probation they must sign on for twelve months or for the duration of the war. The hours are from 8 a.m. to 6 p.m., with one and a half hours for meals, and 5d. per hour is allowed for overtime. Stoppages from pay may be made for offences, such as careless or reckless driving, disobedience of orders, applying for sick leave without justification, or for damage to a vehicle caused by accident or neglect for which the driver is held responsible. It will be seen, therefore, that the lot of the lady despatch rider is not an easy one, but those we saw at a large R.F.C., M.T., depot looked particularly well and happy. They are entitled to week-end leave once a month, and to the usual public holidays if the exigencies of the Service permit.



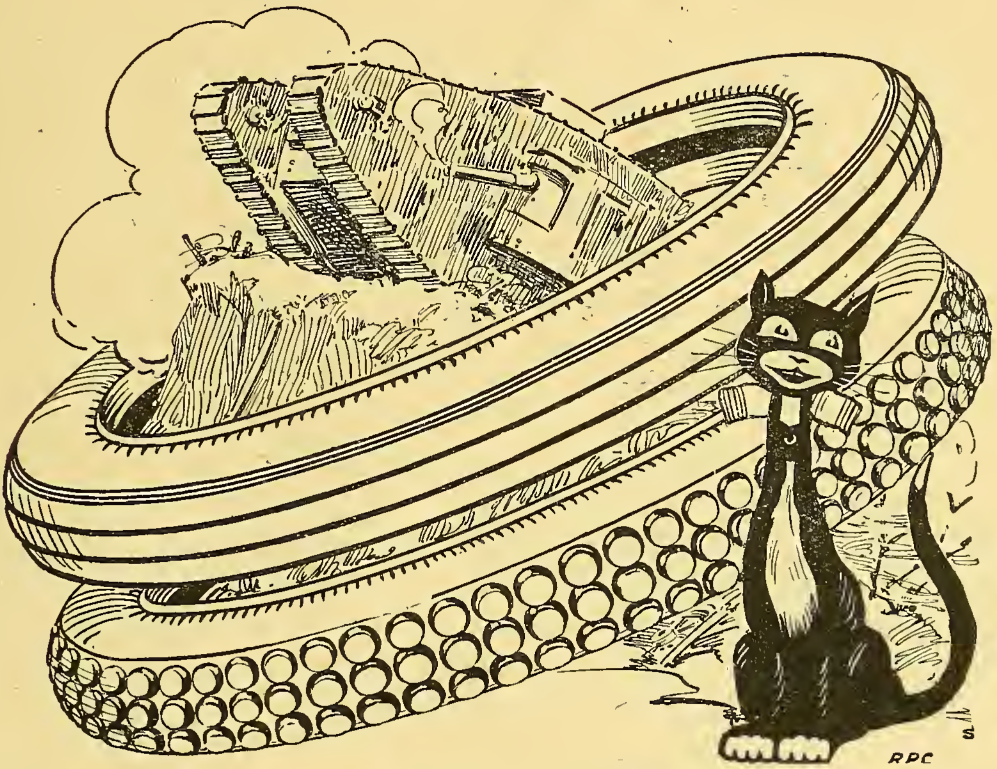
Lady motor cyclists attached to the R.F.C. They have just filled up their P. and M.'s and are ready to go on duty.

The Machines Used.

The girls use standard R.F.C. model P. and M. motor bicycles and sidecars, and have to clean their own engines, make small adjustments, and generally maintain the machines, but the mud is removed

HUTCHINSON

"The Tyres with NINE Lives"



STRENGTH and DURABILITY

Hutchinson Tyres, like the tanks, have been built for hard, gruelling service. The strength and durability of Hutchinson Tyres have established their supremacy "on active service," and their hard-wearing qualities are enabling the motor cyclist "at home" to practise the strictest economy in tyre maintenance. For long mileage at low mileage cost Hutchinsons have no equal.

HUTCHINSON TOURIST TROPHY TYRES

THREE-RIBBED OR RUBBER-STUDDED.

A copy of our 1918 Catalogue, containing full details, prices, etc., will be sent post free on request. Why not write for your copy TO-DAY?

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70, Basinghall St., LONDON, E.C.2.

The use of this Badge is an indication that this Firm has been accepted as genuinely British by a tribunal of Trade Competitors.

AT the present time SUNBEAM MOTOR BICYCLES can only be supplied under a Ministry of Munitions permit, but the Makers have a waiting list for those who desire to possess them at the earliest possible moment when conditions begin to become normal.

Further particulars will be sent on application to ——————

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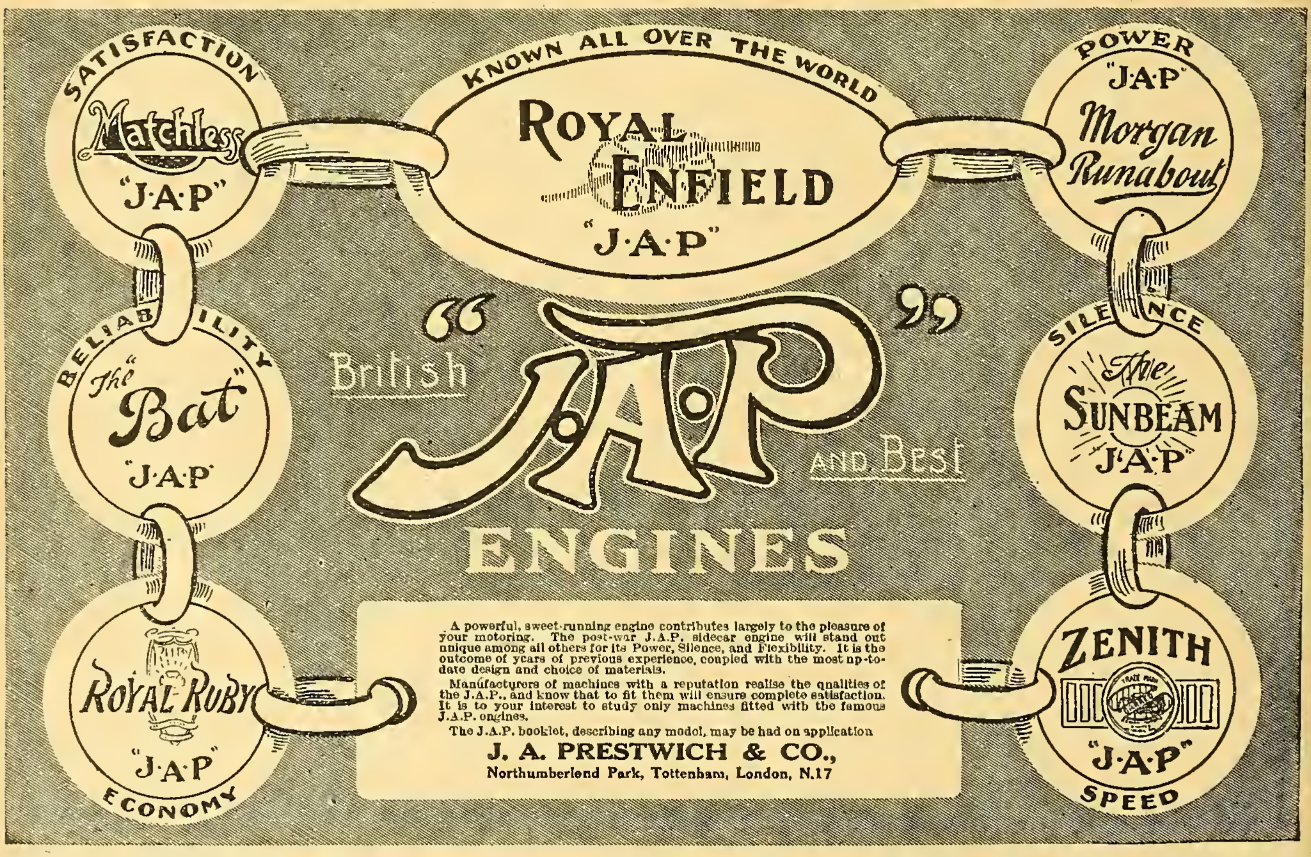

A powerful, sweet-running engine contributes largely to the pleasure of your motoring. The post-war J.A.P. sidecar engine will stand out unique among all others for its Power, Silence, and Flexibility. It is the outcome of years of previous experience, coupled with the most up-to-date design and choice of materials.

Manufacturers of machines with a reputation realise the qualities of the J.A.P., and know that to fit them will ensure complete satisfaction. It is to your interest to study only machines fitted with the famous J.A.P. engines.

The J.A.P. booklet, describing any model, may be had on application

J. A. PRESTWICH & CO.,
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Lady Motor Cyclists in the British Army.—

by mechanics. One of the ladies in the group qualified for the R.A.C. driving examination some six months ago, then took up ambulance work, applied for a post Overseas, but, as she was found to be medically unfit for work abroad, she then became an R.F.C. despatch rider, although she had never ridden a motor cycle before.

The lady despatch riders are engaged in short journeys only, chiefly in the Metropolitan area, and rarely go very long distances. One of them told us that the longest journey she had had was as far as Woking. Their usual uniform is that in which they are shown in the accompanying photographs, but in wet weather they are provided with oilskins and waterproof leggings. The lady car drivers are, of course, well protected from the elements, as their vehicles are provided with efficient hoods and screens, and we cannot but express the greatest admiration for the brave girls who carry on in their duties in all weathers and throughout the whole year with so small a protection as the average motor cycle affords.

OVERSEAS TRADE DEVELOPMENT.

A Scheme for the Motor Cycle Trade only following the Main Lines of Sir Charles Mandleberg's General Trade Scheme.

ONE of the most promising indications of the intention of British manufacturers to tackle seriously the problem of Overseas trade after the war was the meeting of some of the important men in the industry, recently held in Birmingham, at the invitation of the Sphinx Manufacturing Co., who acted as hosts on the occasion.

Briefly, the scheme submitted by Mr. H. G. Longford, a director of this company, was one providing for co-operative action, by a group of non-competitive firms in the motor cycle, tyres, and accessories sections of the industry, in the Overseas market, commencing with Canada as a field possessing very great potentialities. This is also a market that has not, up to the present, been cultivated to any serious extent by many manufacturers.

It is proposed that the firms joining in the scheme shall take steps as soon as practicable to develop business in Canada by the creation of a thoroughly well organised central depot in the Dominion: this central depot being the headquarters of the firms concerned, and providing ample showroom, office, and stores accommodation. A full stock of machines, accessories, and spare parts will be carried, and this, it seems to us, will go far towards overcoming one of the most serious complaints of our readers in the territory referred to, viz., the difficulty of obtaining adequate service, and especially spare parts, accessories, etc., at reasonable rates; this difficulty, of course, obtaining not merely in Canada, but practically in every other part of our Empire.

The Sales Organisation.

One assumes that from the central establishment there will be developed a really first-class sales organisation, employing "live" men capable of more than holding their own with their competitors; and, in passing, we would venture to suggest that there will be no room for any other than first-class, well-paid men, if the scheme is to be successful.

It is to be hoped that this central depot will not exist for the purpose of showing profits on its own account, as a distributing agency: its aim rather being to deliver goods through appointed agents to the consumer with the least possible addition to the retail prices obtaining in Great Britain.

Fixed retail prices throughout the Dominion, which must compare favourably with the home prices, together with an ample supply of spare parts and accessories, also sold at reasonable prices, are features which, if adopted, will enormously increase the selling possibilities of British machines.

After-the-War Methods.

There was never a time in the history of the movement when it was more definitely "up to" British manufacturers to convince motor cyclists at home and abroad that their after-the-war methods will meet the needs of the case, and so we welcome this suggestion of a practical step in that direction, and think it well to inform our readers—particularly those Overseas—of what it is proposed to do.

The meeting was adjourned for a month, in order to consider details; and it is requested that any manufacturers interested who were not present should communicate immediately with the Sphinx Manufacturing Co., who, it should be added, are not putting forward this scheme on their own account, but merely because it is necessary for one firm or another to take the first step.

COAL GAS FOR MOTOR VEHICLES.

WE have already stated that a prize of £1,000 has been offered by the Automobile Association and Motor Union for the best invention enabling coal gas to be used with advantage as a propellant of motor cars and motor cycles. The conditions which have now been published are framed with the idea of enabling motorists to carry sufficient gas in a small space not exceeding nineteen cubic feet, to provide the equivalent of between two and three gallons of petrol, and so ensure a possibility of running cars distances of approximately fifty miles on one charge of gas. The conditions are so drafted that the winner of the prize must place his invention at the disposal of the British motoring public on terms fair to himself and users.

Intending competitors may obtain copies of the entry form and conditions upon application to the Secretary of the Automobile Association and Motor Union, Fanum House, Whitcomb Street, London, W.C. The competition will close on the 31st of December, 1918. There is no entrance fee or charge of any description.

CURRENT CHAT

Time to Light Lamps

GREENWICH TIME.

Mar.	14th	6.30 p.m.
,,	16th	6.33 ,,
,,	18th	6.36 ,,
,,	20th	6.40 ,,

Prices of Petrol.

The retail price of petrol has fallen one halfpenny per gallon, No. 2 "War Spirit" now being obtainable in England and Wales at 3s. 5½d. per gallon, while No. 3 grade is sold at 3s. 5d. per gallon.

Magneto Production.

Nothing in connection with the motor industry since the outbreak of war is more significant, perhaps, than the way in which British manufacturers have risen to the occasion to produce magnetos to replace the supplies which formerly came from Germany.

Trading Possibilities in Uruguay.

According to an American motor cycle journal, there are some trading possibilities awaiting an enterprising firm in the South American Republics. J. H. Figuerra, Calle Magallanes, 1,070, Monte Video, Uruguay, South America, is asking for motor cycle catalogues to be sent to him, with a view to future business. Would any English firm care to answer his request, which, of course, is addressed to the American trade?

The German Intellect Again.

We cull the following from the *Birmingham Daily Post:*

"AMSTERDAM.

"A frontier correspondent of the *Telegraaf* reports that the Germans at Zeebrugge have adopted a new method for catching hostile airmen. Towards evening they send up twenty captive balloons without crews and attached to electrified steel cables. The electric barrier thus created constitues a great danger to all airmen coming into contact with it.

And here's the Plum!

"The Germans have also manufactured a new and improved type of aeroplane, fitted with three propellers, one being so arranged that it can keep the aeroplane for some time stationary above a certain point, thus permitting the bomb-thrower to aim with greater accuracy.—Reuter."

Licence Coupons for Motor Spirit.

The Motor Spirit Order issued by the Board of Trade informs licensed dealers that from and after March 1st they must not take delivery of any motor spirit from any person for the purpose of resale without handing to such person petrol licence vouchers representing the same number of gallons as are then delivered to him. The effect of the Order is merely to restrict the replenishment of a licensed dealer's motor spirit stock at the end of a month to the amount of his sales during that period.

A Tragedy.

A correspondent seeking information begins his letter, "Having bought a motor cycle which has been converted into gas . . ." Poor fellow! he has our sincerest sympathy!

Finances of the Motor Cycling Club.

The Motor Cycling Club has invested the balance of its funds—some £475—in War Loan. The activities of the club, of course, have been in abeyance since January, 1915, and members now pay the nominal subscription of 5s. per annum only, while those serving with the Colours pay no subscription at all.

Four Cylinders.

We understand that a number of British motor cycle firms are angling in four-cylinder waters. Several have models on paper only, but one or two have experimental machines on the road. Who will be the first boldly to acknowledge their conversion to this fascinating type? More than one of them have stated that, for sidecar work, the four-cylinder is it.

Maj. Chas. Jarrott, the one time famous racing motorist, was recently invested with the Order of the British Empire. In the very early days of motor cycling he rode a racing motor tricycle.

Special Features

THE BICYCLIST'S EQUILIBRIUM.

A MACHINE FOR THE MULTITUDE.

TWELVE MONTHS WITH A JUNIOR TRIUMPH.

£1,000 Prize.

The conditions relating to the prize offered by the A.A. and M.U. in connection with coal gas are now ready.

From Cairo to Jerusalem.

The Church Army Organiser has recently undertaken a motor bicycle ride from Cairo to Jerusalem.

Training of Disabled Soldiers.

At the request of the Ministry of Pensions, the Kent Education Committee has prepared a scheme for training disabled soldiers in professional, commercial, and industrial occupations.

£300 Petrol Penalty.

Judgment for £300 penalties for using petrol without a licence was given in the King's Bench by Mr. Justice Darling against Mr. E. W. Beeston, a Birmingham bookmaker. For the defence it was stated that the petrol had been used for driving out wounded soldiers, and not for business purposes.

Coal Gas in Paris.

Although coal gas has been used in this country for some time past as a means of propulsion of motor road vehicles, it was not until recently that it was adopted in Paris for the same purpose, though previously it had been used in France for propelling motor boats and tramcars.

A New Law in New Jersey.

In a recent issue we published a photograph of a youngster eleven years old, who is a resident in New Jersey, using a Smith Motor Wheel to ride to and from school. Now we understand that the minimum age at which anyone will be allowed to ride a motor cycle in that State will be sixteen years, and no licences will be granted without examination of the candidate in the future.

Pleasant Office Situation.

Messrs. A. J. Stevens and Co., Ltd., the well-known motor cycle manufacturers, of Wolverhampton, a few months ago acquired property adjoining their works, and transferred their offices thereto. "Graisley House," Penn Road, is an old Georgian residence standing in its own grounds, and picturesque, despite its situation in a Black Country town. To conduct a motor cycle business in lofty rooms, from whose windows one looks across green lawns littered with crocuses and snowdrops, with a background of sturdy ornamental timber trees, is to make almost a joy of a modern business life; this departure is typical of this go-ahead firm

eft of Magnetos.

n March 1st the premises of Mr. D. Cox, 6, Lansdowne Hill, West Nor- od, were broken into and several mag- os stolen. A reward of £10 is offered the recovery of a single-cylinder sch car magneto, anti-clockwise, with broken off the small advance lever of contact breaker.

everal four-cylinder magnetos were stolen.

m Coast to Coast by Motor Wheel.

ecently a Mr. Hubbard, of Wheeling, stern Vancouver, rode a tricycle pro- led by a Smith motor wheel from coast coast. Lashed to the side of the rier, behind the tricycle, he carries a r of crutches. A newspaper reporter de the extraordinary statement that carried the crutches as a precaution inst accident. The real facts of the tter, however, are that Mr. Hubbard ers from rheumatism, and he uses the tches to aid him in getting about when iged to leave his machine.

e "Omniscient" Editor

ruly, the Editorial staff is accredited h a wonderful knowledge, and is ected to answer all sorts of difficult stions! The latest query which we e received in French from "*Un moto- liste livrant* 'The Blue 'Un'" when nslated reads: "Having read the icle enclosed in *l'Excelsior*, and being selves wounded and finding the deed extraordinary one, we ask if it is sible to give us further information on matter." The paragraph referred to ls with the case of Pte. J. Taylor, don Fusiliers, who has received the .M. for his extraordinary bravery persistence in avoiding being taken soner through sheltering for forty days a shell hole and then finally escaping the English trenches, which were a e distant. The story is absolutely hentic, and a medal has been awarded this brave deed, but we fear there is further information which we can give French reader.

A New Ration.

Pelican Pie: A New Ration, is the title of a new and very brightly-written Service journal, the official organ of a West Riding Division. The magazine is well written, excellently illustrated (all by members of the Division), and contains a Motoring Notes page written in humorous vein.

IMPORTANT NOTICE.

Owing to the Easter Holidays, the issue of "The Motor Cycle" for March 28th must be closed for press earlier than usual. All copy and instructions for Miscellaneous Advertisements in that issue must, therefore, be in our hands not latter than first post on Thursday, March 21st.

Motor Fuel from Coke.

L'Auto, so Reuter's Paris agency informs us, states that the French have discovered a new motor spirit which has been successfully used on a car. The fuel is claimed to be produced by the distillation of the heavy oils obtained from coke, and, so our contemporary points out, the by-products will be available for the preparation of explosives. One of the advantages claimed is that there is no deposit of carbon in the cylinders and on the piston when this fuel is used.

It is also claimed that the residues of combustion have the properties of lubricating the cylinders, and consequently less oil may be used; also that the fuel consumption is less than when petrol is employed.

The details of the fuel are somewhat meagre, but we are informed that trials were carried out with an unpurified liquid, and better results are expected when a refined form is used. The smell resembles that of wood used for wood paving.

National War Funds.

The National Relief Fund (distributed £3,783,657)	£6,333,028	0	0
British Red Cross	9,441,433	3	9½
Tobacco Fund	149,654	0	0

The Malkin Gear.

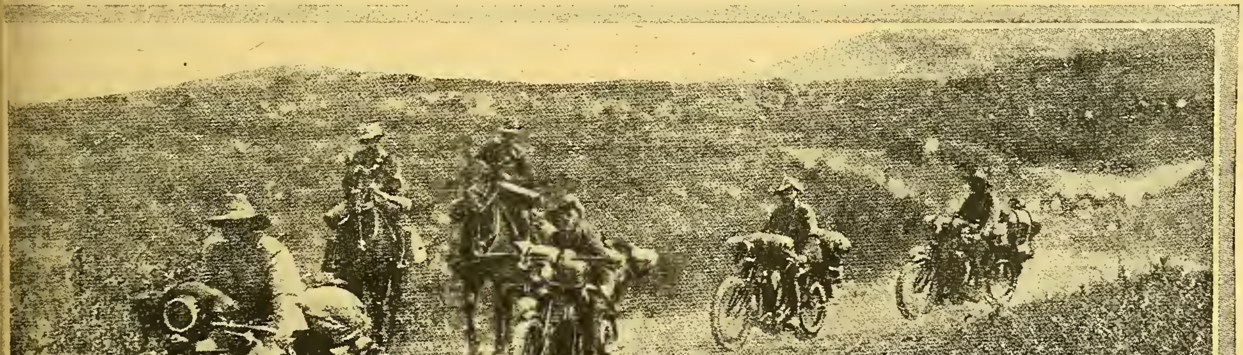
In our issue of February 21st we described a new and ingenious four-speed gear box designed by Mr. B. Malkin. Unfortunately a mistake occurred in the description. The pinion H should have been described as fixed on the layshaft and not as free to revolve on it. The gear would work quite well, however, even if the pinion H were free to revolve as originally stated.

A Petrol Rumour.

In view of a rumour that in the near future all petrol supplies for private use are to be cut off and the use of gas encouraged, we have approached both the Petrol Control Department and the Petroleum Executive, neither of which is aware of any contemplated Government action of the nature indicated. It is, of course, impossible to say definitely that no further reduction of petrol supplies to private motorists will be rendered necessary at some future date, but such a development is not now under consideration.

A North China Motor Club.

A North China Motor Club has recently been formed and the honorary secretary, Mr. J. Twyford Thomas, 2, The Bund, Tientsin, states that there is a membership of over seventy in Tientsin, while a branch is being formed at Pekin. The club is open not only to Europeans, but also to Chinese motorists, and a number of the latter have signified their intention of becoming members. The distance from Pekin to Tientsin is about eighty miles over dead flat country, and proposals are abroad with regard to making a main road between the two places, in the event of which the North China Motor Club will erect a half-way clubhouse for the use of members.



Despatch riders and the advance in the Holy Land. It is an obvious necessity that they should thoroughly understand the difficult art of securing unwieldy loads to a motor cycle. The bad roads over which they travel thoroughly test their capabilities in this direction.

THE ROYAL AIR FORCE.

DETAILS OF THE FORMATION OF THE NEW AIR FORCE.

A PAMPHLET issued by the Air Council under the Air Force (Constitution) Act shows in detail the conditions under which officers and men in the Flying Services will be transferred to the Air Force. It is curious that the initials R.A.F., representing Royal Air Force, as the new body will probably be called colloquially, are the same as those which stand for Royal Aircraft Factory and the engine which it produces. In fact, the other day we heard an R.F.C. officer, who was talking to a friend about the R.A.F., say, "I mean the Force, not the Factory." The pamphlet is headed "Transfer of the Royal Naval Air Service and Royal Flying Corps to the Royal Air Force."

Any officer, warrant officer, petty officer, N.C.O., or man who, on a date to be prescribed, belongs to or is attached to the R.N.A.S. or the R.F.C., may be transferred to the Air Force without his consent. It is also made clear that officers will have three months in which to make up their minds whether they prefer to be transferred, and that no officer will suffer either as regards pay or pension because of transfer. The following are among the principal points: Every officer or man in the Force, who is medically fit, will be liable to be called upon to go into the air, either in airships, aeroplanes, or kite balloons, and may be ordered to any station at home or abroad.

The new cap of the Royal Air Force. The two bars beside badge denote rank of wearer.

Any person transferred or attached may within three months of transfer or attachment give notice to his C.O. that he does not desire to be so transferred or attached, and the transfer or attachment is to be annulled without prejudice to the validity of anything which may have been done in the meanwhile. The duration of *attachment* shall be for the period of the war, or a period not exceeding four years, and no person *transferred* shall be liable to serve with the Air Force for any longer period than that for which he would have been liable to serve had he continued in the Force from which he was transferred. Officers and men attached will be kept for whichever period (duration of war or four years) is the longer *(sic)*.

Continuity of Service.

In the case of any person transferred to the Air Force, for the purpose of pay, pension, gratuity, retired or half-pay, and of any decoration or reward dependent on length of service, any previous service with His Majesty's naval or military forces which would have counted as service, towards pay, pension, gratuity, retired or half-pay, or such decoration or reward if he had not been so transferred, will be deemed to be service with the Air Force towards pay, pension, gratuity, retired or half-pay, or such decoration or reward.

In the case of any person *attached* to the Air Force the fact that he is so attached will not affect any righ to any pay, pension, gratuity, retired or half-pay, o such decoration or reward as aforesaid, already earne by him in such branch of His Majesty's naval o military forces to which he belonged at the date o which he was so attached, shall for the purpose o any provisions relating to pay, pensions, gratuity retired or half-pay, or such decoration or reward, b deemed to be service with that branch of Hi Majesty's naval or military forces to which he belonge at the date on which he was so attached.

Questions of Rank and Pay.

It may be taken as a governing principle that n officer or man will suffer during the war by reason c transfer to the Air Force in respect of pay of th rank held by him in the Nav or Army immediately befor transfer; an officer or man however, may be required t relinquish his temporary c acting rank under the existin rules of the Services. Nor wi officers or men suffer through an revision of the rates after the wa as regards pay or pension of th rank held by them on the date c such revision. At the same tim it must be borne in mind that cer tain emoluments have only bee authorised for the period of th war, and this limitation mus equally apply in the Air Force.

Full particulars as regards pa of officers and other ranks are given in the pamphlet the corresponding ranks and appointments in th existing Flying Services, and information as regard allowances, pensions, half-pay, income tax, priz money, prize bounty, and war gratuity.

In the Air Force motor cyclists are counted as i the non-technical branch, though drivers of steam an petrol waggons are accounted technical.

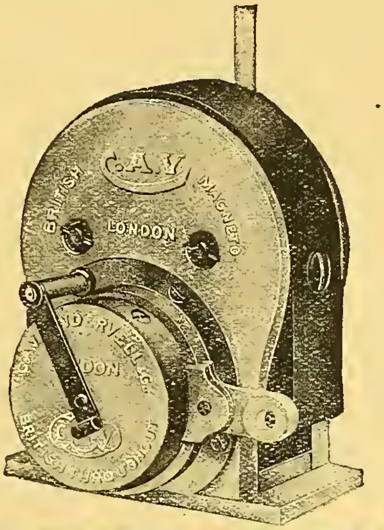
Wing commanders and wing observers R.N.A.S. and wing commanders R.F.C., or officers of equiva lent ranks in the technical and administrative branche become lieutenant-colonels in the Air Force. In th same manner squadron commanders and squadro observers R.N.A.S., and squadron commander R.F.C., become majors. Flight commande R.N.A.S. and flight observers R.N.A.S., and fligh commanders R.F.C., become captains, flight lieu tenants and observer lieutenants R.N.A.S., and flyin officers and observers R.F.C. become lieutenants, an probationary officers become probationers.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

To Motor Cyclists!

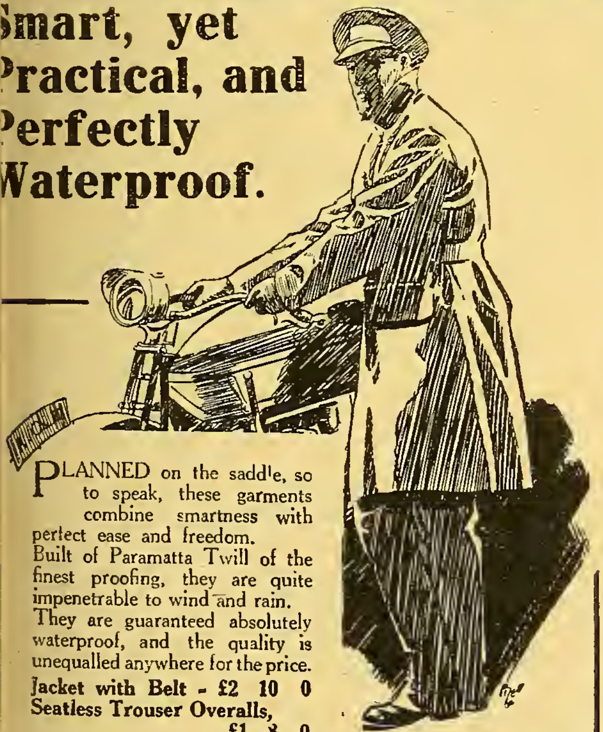


WHEN the question of a MAGNETO crops up, take the tip from the man at the front, and plump solidly for C.A.V. — the All-British Magneto that is daily proving its worth under the most strenuous of War conditions.

C.A. Vandervell & Co., Ltd.,
ACTON, LONDON, W.3.

Members of the British Ignition Apparatus Association.

Smart, yet Practical, and Perfectly Waterproof.



PLANNED on the saddle, so to speak, these garments combine smartness with perfect ease and freedom. Built of Paramatta Twill of the finest proofing, they are quite impenetrable to wind and rain. They are guaranteed absolutely waterproof, and the quality is unequalled anywhere for the price.

Jacket with Belt - £2 10 0
Seatless Trouser Overalls, £1 8 0

Dunhills, Ltd.,
2, Conduit St., Regent St., W.
359-361, Euston Road, N.W.

Manchester:
90 & 92, Cross Street.
Glasgow:
72, St. Vincent Street.

TRADE MARK

Bowden Wire Ltd:

LONDON

VICTORIA RD., WILLESDEN JUNCTION, N.W.10

THE varied uses and adaptations of Bowden Wire mechanism are recognised by almost every department of State Service. The war work which we have in hand for Home and Allied Governments precludes for the present our acceptance of private orders.

Established 1897.

Economical Insurance for Motor Cyclists

PROVIDENT ACCIDENT AND GUARANTEE COMPANY, LIMITED,

FORMERLY KNOWN AS
THE PROVIDENT CLERKS' AND GENERAL GUARANTEE AND ACCIDENT CO., LTD.
ESTABLISHED 1865.

REASONABLE POLICY CONDITIONS. PROMPT SETTLEMENT OF CLAIMS.

£10 REWARD.

£10 will be paid for information which may lead to the recovery of a "Royal Enfield" 6 h.p. Combination. Registration No. MX 6681, Engine No. W 5071. Special screen and hood, Watford speedometer No. 705, 1915 make. Also the same amount will be paid for similar information leading to the recovery of a 1914/15 3½ h.p. Twin "Zenith," Engine No. 52830, mag. chain case slightly damaged. "Matchless" 8B Model, Engine No. 34572, Frame No. 3041, Regd. No. LR 3766 undertank tube cracked at head.

PREMIUMS FOR PRIVATE USE ONLY.
VALUE OF MOTOR CYCLE and SIDECAR.

H.P.	Not Exceeding £50.	Exceeding £50.
Under 3½	£2 7 6	£2 10 0
3½	2 10 0	2 15 0
4½	2 15 0	3 0 0
5—6	3 0 0	3 10 0
7—9	3 17 6	4 7 6

15% REDUCTION IF INSURED BEARS THE FIRST £1 OF ALL CLAIMS.
25% " " " " £2 " "

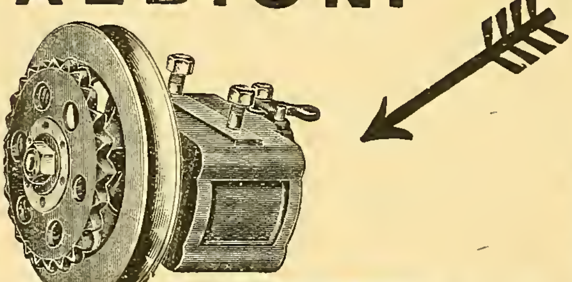
Extra benefits and Personal Accident Insurance included at slightly increased premiums.

FULL PARTICULARS ON APPLICATION TO—

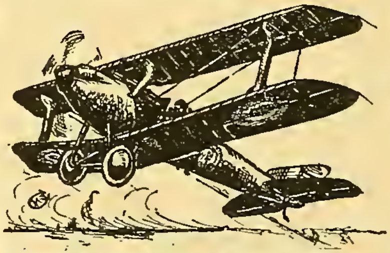
Head Office: 61, COLEMAN STREET, LONDON, E.C.
West End Office: 199, PICCADILLY, LONDON, W.

Telegrams—"Perpend, Ave, London." Telephone—London Wall, 5306 (4 lines).

ALBION.



ALBION ENGINEERING CO., Ltd.,
Upper Highgate St., BIRMINGHAM.



'Phone: Cambs. 5.
Wires: "Carbon, Cambs."

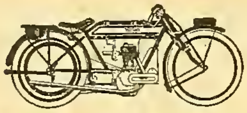
All Enquiries to
Registered Offices—
30B, St. Andrew's St.
CAMBRIDGE.

LEARN AVIATION!

FLYING Course for R.Ae.C. Pilot's Certificate
CORRESPONDENCE Course in Aero-Engineering

BY THE **CAMBRIDGE SCHOOL OF FLYING.**

In writing for particulars, state which course is desired.



IMMEDIATE DELIVERY OF MILITARY MODELS.

WRITE FOR NEW BOOKLET, "WHY A SINGLE-CYLINDER, AND NORTON DRIVING HINTS."

NORTON

Norton

NORTON MOTORS, Ltd., ASTON, BIRMINGHAM. LONDON: BARTLETT & CO., GT. PORTLAND ST.

MILITARY NOTES.

ore Flat Twin Enthusiasm. Another D.C.M. D.R.'s of the First Expeditionary Force.

FFICERS' BADGES CONTROLLED.

B a new Army Council Order, bronze metal cap or collar badges for officers' service dress must be manu- red according to War Office pattern, hey are not to be sold for more than per badge. If of silver or gilt the is not to exceed the cost by more twenty-five per cent.

* * *

FROM THE MESOPOTAMIAN EXPEDITIONARY FORCE.

A BELATED season's greeting card has just arrived from Maj. J. W. Coring, A.S.C., who is in Mesopo- . The humorous rhyme, which pre- a list of battles, runs :

> T medal of ours with its ribbon and bar
> T of the crushing defeats of the Crescent and Star.
> 'T a pleasant reminder to friends far away
> T more than one Turkey is ruing '*The Day.*' "

e list of engagements is longer than would have imagined, twenty-six the number given, from Fao to the gement at Ramadie.

* * *

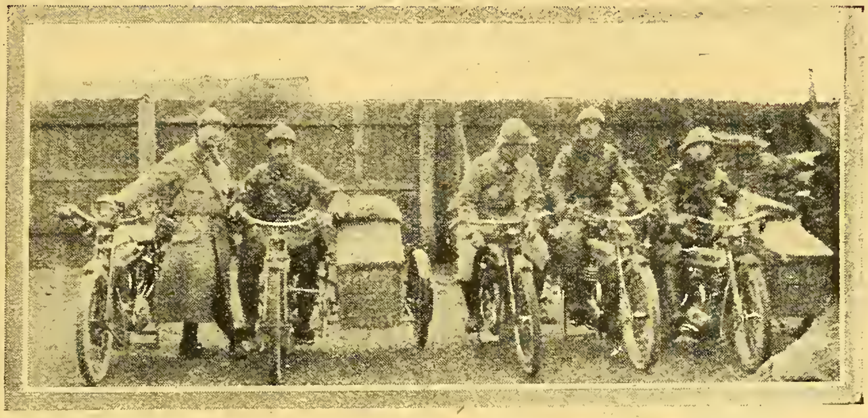
FLAT TWIN ENTHUSIAST.

A D.R. of a Divisional Signal Company in Mesopotamia writing under the *nom de plume* "Tiffy" sends a iptive letter on the way flat twins tanding up to their work.

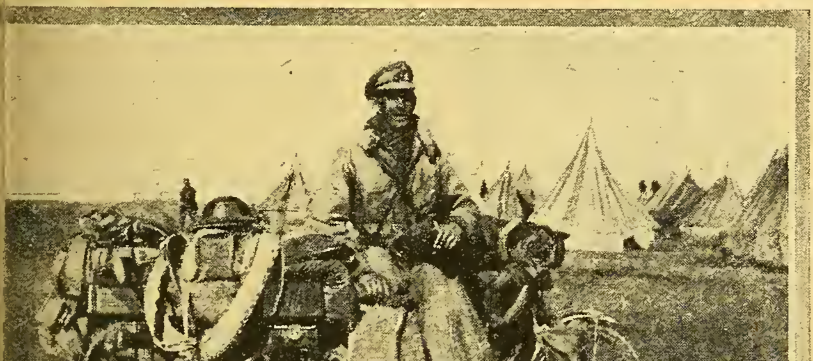
"n our Division we have both Triumph Douglas machines, and both makes of ines are standing up to the terribly work wonderfully well. The las has made quite a name for itself here; even riders who did not care he Douglas have had to say it is rkable the way it behaves. The nph bas not enough clearance, and ront springing is not all that can be ed. The clearance requires to be at 6in. in consequence of the sand and which is 6in. to 12in. deep, and in places - even more. Although in some places it is quite decent travelling, in others it is like riding over ploughed fields—in fact, in certain districts the land has actually been ploughed up and left. When travelling one has to be always on the look out for holes and dips which one comes upon suddenly, and in these instances the Douglas's high clearance is a benefit. The Triumph's kick-starter and hand-controlled clutch, however, are a blessing.

"If tyre manufacturers had to test their tyres on the wet, muddy roads which prevail out here to judge their non-skidding qualities they would give up in despair of ever making a non-skid cover. It is worse than Thames or Derbyshire mud. On these roads the Douglas is supreme.

"*The Motor Cycle* is always welcomed, and much looked for, as it keeps us in touch with things at home. For my own part, I think the horizontal twin has come to stay, and I want nothing better than to get back on Blighty roads with one."



French despatch riders at the rear of the fighting line. Many thousands of the wicker sidecars shown are in use on the French fighting front.



pl.-Art. H. Russell, who is despatch riding in Macedonia. The ample kit is worthy of note, and the fact that the carriers stand such loads speaks well for their construction.

D.R.'S OF THE FIRST EXPEDITIONARY FORCE.

FROM a recent number of the *Gazette*: "Corps of R.E.'s.—Temp. Lt. to Temp. Capt., to retain their acting rank where specified, H. H. Berlandina and R. G. Larkin." Both were competition riders before the war, and were among the D.R.'s who crossed over with the first Expeditionary Force.

* * *

O.B.E. FOR NAVAL RECRUITING OFFICER.

LT. JOHN HODGENS, commodore of the Swansea Naval Brigade, who was recently decorated with the O.B.E. by the King, holds the blue riband for Wales and the West of England for single-handed naval recruiting. Also he is the first naval recruiting officer to obtain the O.B.E.

* * *

WAR OFFICE PURCHASES.

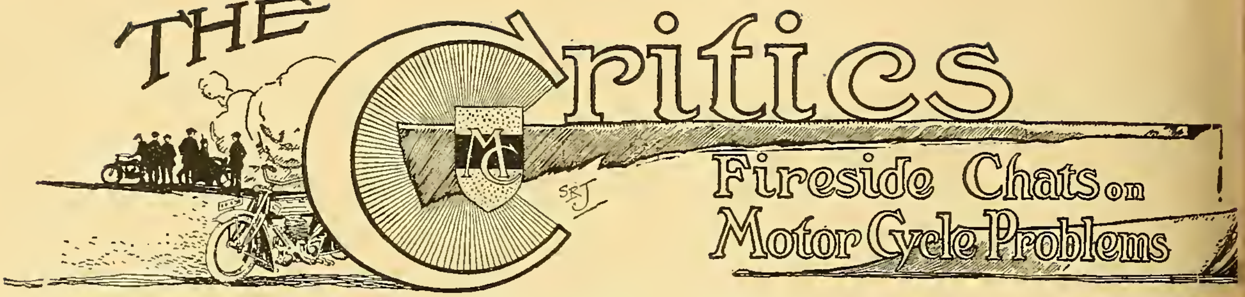
THE statement of War Office purchases, as quoted by Mr. Macpherson, is as follows :

TOTAL.—£270,000,000 of manufactured goods. FOOD.—Preserved meat, £12,000,000; tea, 84,000,000 lb.; sugar, 177,000,000 lb.; milk, 145,000,000 tins. TOBACCO.—Pipe and chewing tobacco, 8,500,000 lb.; cigarettes, 11,000,000 lb.

* * *

MOTOR CYCLIST WINS THE D.C.M.

WE congratulate an old reader of *The Motor Cycle*, Gnr. A. E. Milsom, M.G.C., on having been awarded the Distinguished Conduct Medal. Gnr. Milsom resided in Geneva. On a recent occasion he followed the armoured cars into action on his motor cycle, though under heavy fire at 800 yards from the enemy trenches, in order to maintain communication between the cars and headquarters. This enabled early information of the enemy's disposition to be sent back to H.Q. The deed is one of which any man might be proud, and the decoration was certainly well earned.



THREE-WHEEL DESIGN.

"BEASTLY things!" said the Novice, with a vindictiveness quite foreign to his usual mildness of speech. "If I could afford anything better, I would not be found dead in one."

The Novice had been out all day through mud and slush on his sidecar; hence this unusual outburst. "And yet," he pursued, "one hears of manufacturers still preparing special luxurious sidecar models for after the war. I call it absolute folly."

"Why?" The question was shot from the D.R. The Novice gave him a cautious look. He did not like arguing with the discharged soldier, owing to the latter's propensities for becoming personal.

"Well," he pursued, a shade nervously, "who is going to buy a beastly exposed, uncomfortable, and unsociable thing like a sidecar if there is anything better to be had?"

"Oh, bilge!" expostulated the D.R. "People have been talking like that ever since sidecars came in, yet for years they have held their own. Has not the sidecar had a hundred rivals and outlived them all? What about the scores of cycle cars? The Morgan is almost the only one that survives, and there are numbers of men who would prefer a good sidecar outfit even to a Morgan."

"That's true," put in the Manufacturer. "But why was it the cycle car did not survive? Simply because every tinker and cobbler in the back streets of Birmingham tried to scrape something together and sell it to an enthusiastic public under the name of a cycle car. The result was that the type earned an abominable name, and decent firms steered clear of it."

With this the Journalist agreed. He said that the failure of the cycle car was not owing to its impracticability, but for want of support from real engineering establishments, and from general prejudice caused by built-up abortions. "Some of the little Humberettes, for instance, were marvellous," he added. "And now that such engineers as Alfred Scott——"

An Unworthy Prejudice.

But at this the D.R. held his head and groaned loudly. "I can stand Humberettes and Morgans," he said, "but when you begin to throw Scott Sociables at me I give in. Of all the outlandish ——" but words failed him. The Journalist was regarding him narrowly.

"I should have thought you were too much of an engineer to give way to such petty narrowness," he said. "You, like scores of others, do not like the Scott Sociable simply because it is unconventional—because you are not yet used to it. You would discourage originality in design—the very thing on which progress is dependent—simply because it is 'ugly.' Was not the sidecar 'ugly' when first it came in? Did not the first disc wheels you saw strike you as being hideous? Even the railway engine, the motor 'bus, the motor car itself, have all been hideous in their time, and such bigoted and narrow-minded critics as you have condemned them on those childish grounds. Where should we be to-day if the world's engineers had been discouraged by criticisms levelled at the appearance of their inventions, and what, after all, is the Scott Sociable?"

The D.R. said that he knew, but would rather not say.

Price and Comfort.

"I'll tell you what it is," pursued the J. "It is purely and simply your beloved sidecar outfit, possessing all its advantages, but aiming at eliminating its numerous weaknesses. The so-called luxurious sidecar outfit is the freak—not the Scott Sociable. In the sidecar you have your motor cycle, which is practically unrideable till you attach a sidecar—a separate and distinct unit—to it. You do so by means of couplings and bent stays, which are apt to bend or creep till the whole thing is out of alignment, then you proceed to ride, experiencing all the discomforts of the solo mount, enjoying none of the comforts of the rigid vehicle."

"Oh, go on!" interposed the D.R. "The sidecar has proved itself pretty well, anyway."

"That's just my point," pursued the J. "It has proved itself so well that it is worth constructing on engineering lines, designed as a three-wheeler throughout, and affording the advantages that a rigid double-track vehicle should afford. I consider that the general lay-out of the Scott Sociable is an excellent example of a truly engineering attempt to bridge the gap between the sidecar and the light car."

"Oh!" exclaimed the D.R.; "so you do think that the sidecar will live on, after all?"

"Certainly I do—but only as an attachment. I think that the hundred-guinea vehicle on the lines of the Scott and the Morgan will absolutely oust the heavy type of outfit vulgarly known as a combination. No one will think of spending £110 on such an outfit when at the same price or £10 more he can purchase a vehicle affording car comforts."

There was a moment's silence. "
I cannot understand," said the
eventually, "is that everyone does
buy a Morgan instead of frivolling a
his cash in a sidecar outfit. Why did
Novice, for instance, go and buy a bea
sidecar when for approximately the
money he could have bought a Morga

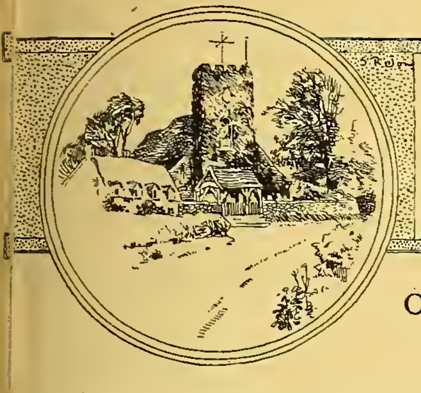
"I really do not know," retorted
Novice. "I agree with you that it
an act of extraordinary folly. Poss
it was because the workmanship of
£100 motor cycle was infinitely supe
to anything in the way of cycle
then obtainable. It was peculiar to
breed, almost without exception,
they employed gas piping for the cont
while the finish simply made one gid
Anyway, the Journalist is fearfully
on the Scott Sociable, and I must a
with D.R. in that the inventor has
out of his way to be unusual."

The Journalist did not think so.
thought the design of the Scott Soci
quite obvious and straightforward.
a three-wheeler it possesses those ad
tages which the sidecar has proved to
very real advantages. It has only
tracks instead of three. It can turn
the length of its own wheelbase. Exp
ence on the track has shown that
common tricycle principle, one w
centrally in front, is unsafe and
possible at high speeds. The single w
behind is all right, except that it has
withstand enormous side stresses, in a
tion to driving. Therefore we are redu
to the one and only practical design
three-wheeler—the right-angled tric
Why should a right-angled tricycle
freakish, and any other form of tric
permissible? Personally, I am by
means convinced that the right-angle
not the best of them all."

Four Wheels?

"It may be," said the Manufactu
"but why tie oneself down to th
wheels? Why not avoid all taint
freakishness and go in for four in a se
ible, straightforward manner? You yo
self state that the cycle car is a pract
proposition, and the general public wo
infinitely prefer it to any type of th
wheeler."

The Journalist thought a mome
"We are treading on rather diffi
ground," he concluded. "What we
discussing is the vehicle to fill the
between the motor cycle—with light s
car attachment if you like—and the li
car. As soon as you get into
wheels you arrive at a different c
which, to be truly roadworthy in ev
sense, must be much more costly t
the three-wheeler.



THE D.R. THROUGH FRENCH SPECTACLES.

ON THE EXPLOITS AND ADVENTURES OF BRITISH DESPATCH RIDERS.

IN the issue of our French contemporary, *L'Auto*, of February 9th, there appeared a paragraph stating that in view of the cordial relations which he always existed between British and American sortsmen and French sportsmen, and especially since t whole of civilisation has gathered togher under one flag—the free children of t United States, of England, and of Gaul—they are now united by fraternal affection, ad this has instigated our contemporary to anounce its intention of printing in English a certain portion in its paper concerning vious sports. Most happily *L'Auto* deals i sport of all kinds, but there are occasnally to be found in its pages references to motor clists. The paper has recently published an interesti article entitled "*Les D.R.*," which gives us an iight into the life of our despatch riders as viewed b a Frenchman, and on account of its interest we rproduce it in English.

The Cavalier de Dépêches.

"When on leave in Paris you have doubtless riced English soldiers wearing a blue and white anlet on each arm. This is the brassard of the signal corps, which includes those who keep up communications, or transmit messages, consisting of ordinary signallers, telegraphists, telephonists, pigeon post, etc., and, finally, motor cyclists, who often wear a winged wheel embroidered on their tunics, with the itials 'D.R.' D.R. means despatch rider, erally *cavalier de dépêches*—originally a scout in e Colonial wars mounted on a swift English steed. ut in this terrible war it means an acrobat wearing oggles, leather gloves, and mounted this time on two nd three-quarter horses, or even on four solid horses.

"D.R." means cavalier de dépêches—riginally a scout in Colonial wars, ounted on a swift English steed.

One cannot imagine the work involved for the vibrating steed and for the man who controls it over the ordinary (!) surfaces of the road at the Front, nor can one imagine it at the rear, where there are real roads. Only our readers who have been to the Front can form an idea of the true conditions. In liquid mud, they drive, leap, and bound, especially in winter, on roads in the fighting portions of the line made of wood logs, over terrible bumps, on paths made of brick, which are fatal to the tyres, and over a terrible road of planks, but even these, after the *pavé* from Ypres to Cassel, seem like tracks superior to that at the *Parc des Princes!*

A Wonderful Ride.

"Consideration must also be taken of the climate in which the English D.R.'s are riding in Belgium all the winter—in water, under water, without a day of sunshine, and never on a dry road. How hard the enemy has made their life! The mud is worse than anything else. For a car or a lorry it is nothing, but on a motor cycle! Mud which renders the surface treacherous and provokes sideslip when riding in front of heavy vehicles, and rendering the smallest punctures dangerous. Engine troubles in this hostile ocean are perhaps more unnerving than elsewhere. I knew one D.R. on the Somme who one night of inky darkness—lights were forbidden—covered sixteen kilometres of shell-torn roads without a clutch, the exhaust lifter having broken, but he reached his destination in spite of the fact that his chain was constantly jumping off. On he rode without delaying, among convoys of artillery, and literally between the legs of horses. Can one imagine the will power he had to have? After that he went to sleep on a plank, for the English hate straw. They go to bed on cement, wood, or more frequently on the bare ground. Nothing stops a D.R. The message service continues like a railway time-table, with just the same regularity and controlled to the minute, by night and by day,

"Ceci." vaincra "Cela."

The D.R. Through French Spectacles.—

from G.H.Q. to the infantry in the lines and in direct communication between all units. It is a model of organisation. The D.R., who carries neither steel helmet nor revolver, except when actually going to the Front, according to the English custom, goes on his motor bicycle wherever it is humanly possible. I have seen riders driving in a mist, a few hundred metres from the enemy, in places in which, if the view had been cleared, nothing could have lived for a second. For the British possess the admirable imprudence to go and discover. They hate communication trenches, and shells are not the worst enemies of the D.R. It happens sometimes that the D.R., hearing nothing but the noise of his engine, does not notice shells passing before him, and often enters the 'cone' of an explosion. Shrapnel is also disagreeable, but the free exhaust covers all other sounds, and he can only hear the heavy explosions above his head, and he sees with some annoyance a cloud of black smoke, and if the infantry appreciates the flight of the hornets, the D.R. is content to extend his back, with a tardy regret, of course, that he has left his tin hat at Signal Headquarters.

Sang Froid.

"One day in an advanced post on the Somme, D.R. was on his knees repairing his belt, and Germa shells were methodically coming over. 'The ne lot will be for us,' was the public opinion, and t public was a dozen signallers, who quietly descend into their dug-out, and the following shells continu to arrive, fired at one hundred an hour, or perha more.

"It was only the wall at the foot of which h flung himself which saved the D.R. Two tons earth, pebbles, and various rubbish fell from t heavens on the motor cyclist. When the shower ha subsided he shook himself. An officer approache 'Well, X,' said he, 'how did you like that?' T D.R. smiled, and said simply, 'Oh! Killing!' *Ce veut dire: Tuant. Comme nous dirions. À mour de rire; mais, justement. À mourir.* At which ever body burst out laughing. **Car les Anglais*—kee smiling—*devant les 150, comme les Français, 'ga dent le sourire!'* Is there a German word for that

"HERVÉ LAUWICK."

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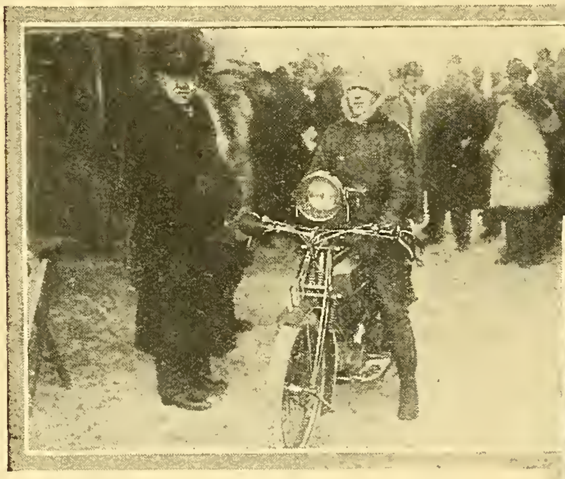
* The author endeavours to explain that the English, like the Frenc "keep smiling," despite the arrival of 150 mm. shells.—ED.

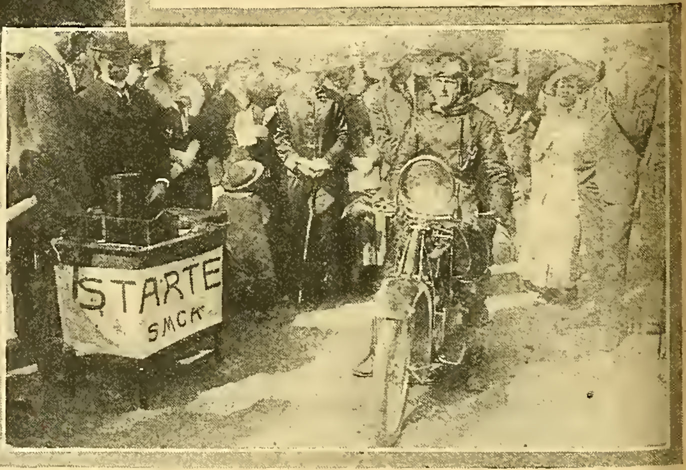
COMPETITIONS IN SWEDEN.

A Three Days 1,000 Miles Trial.

TWO photographs have been sent to us by our Swedish correspondent, Mr. Gustav Göthe. One of the illustrations shows Mr. Göthe on a 3 h.p. Enfield—a make which he has ridden a good deal in competitions since the occasion of the May Trophy in 1912. The May Trophy is the severest Swedish motor cycle trial, over a course of 1,000 miles in extent, which has to be covered in three days. The route is Stockholm, Malmö, Gothenburg, and Stockholm. Note the huge head lamp with which the machine is fitted, which is necessary when riding through the Swedish woods at night time. The ol gentleman standing on the left of the starter is Genera Sir Victor Balck, who was knighted by King George and is a world-renowned patron of sport. On thi occasion Mr. Göthe gained the highest award.

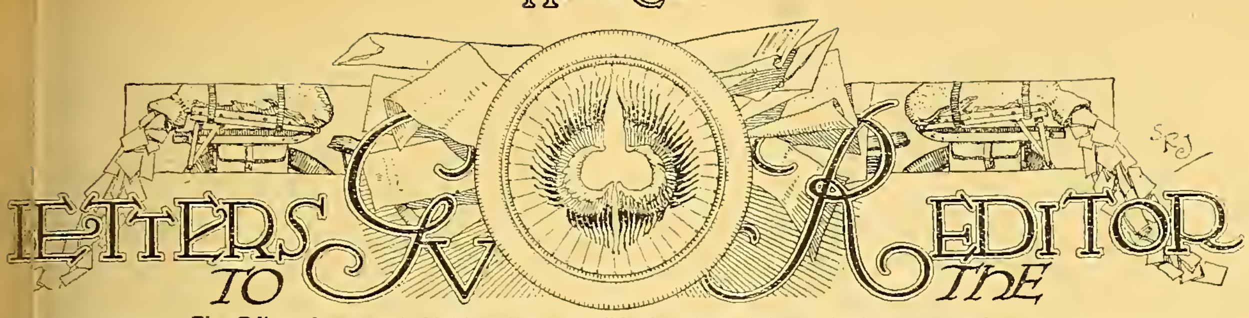
The other picture is of an incident in the Mid winter Trophy, 1917, which was the last motor cycl competition held in Sweden. It was held on th occasion of the Northern Games, and the snow wa tremendously thick. The course was not a very lon one, being only 200 miles, but owing to frost an snow the going was difficult. On one occasio the competitors had to descend to the beac and cross an arm of the sea which was froze over. Again Mr. Göthe won a highest award. The machine he rode was a Husqvarna— Swedish-built motor cycle fitted with a Moto-Rêve engine, and designed by himself.





(Top) Mr. Gustav Göthe aboard a Swedish-built motor cycle—the Husqvarna.

(Bottom) The same rider and his Enfield, which he used in the 1,000 miles Swedish trial.



LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

BRITISH MAGNETOS.

ir,—In reference to Mr. Pendrell's interesting paper on "Motor Cycles," and relating particularly to his remarks concerning British magneto mouldings, your readers may be interested to know that one British magneto firm alone (the one with which I am connected) has supplied over a quarter of a million eminently satisfactory British mouldings fitted to its magnetos used exclusively for aeroplanes.

H. WARREN.

HOW MANY GEARS?

r,—In *The Motor Cycle* of February 21st I noticed a photograph of a machine fitted with a three-speed Armstrong hub as a countershaft gear.

our correspondent, Mr. J. W. Taylor, will no doubt be interested to know that the machine is at present in my possession, and I can bear out his statement that the gear was a valuable addition to the machine.

F. DEWHURST.

AN ATTRACTIVE RUNABOUT.

r,—With reference to the photograph you published in *The Motor Cycle* dated March 7th of Japanese motor wheel enthusiasts at Nagoya, the machine on the extreme left appears to be a "pocket edition" of the Morgan Runabout, but I have not seen anything in this country on similar lines, except invalid carriages.

should be much obliged if any reader could give me particulars as to whether the idea is practicable in England: and if a three-wheeled machine of this type would be rated as a motor cycle.

ARTHUR R. PERRYMAN.

FOOTREST POSITION.

r,—For solo riding amidst traffic, tramlines, and grease is it not far preferable to have footrests almost directly beneath the rider instead of footboards, which are invariably placed much further forward?

know of no machine which gives so comfortable and secure a position as that obtainable on a Rudge with both pedals down.

oubtless the W.D. machines are sound in this respect, and I hope "Motor Manufacturers" will bear the point in mind after the war.

he sit-up-and-beg position is no use on bumpy greasy roads; but on the other hand the average business man will not care to ride spread-eagled. I plump for footrests, placed well back, and semi-T.T. handle-bars. What do Black Country riders say?

ALLON.

GUDGEON PIN SCREWS.

Sir,—I have just met with a little incident which might interest your readers, and make them more careful, when taking down their motor cycle engines for cleaning purposes, e., to inspect the gudgeon pins. I was coming back from Manchester, and when five miles from home the machine, which had run beautifully all the way, pulled up suddenly, gave a violent lurch forward, nearly throwing me and my passenger in the air, and then stopped dead, and would not move an inch. We then had to push the machine home.

I took the engine down, and found that the grub screw, which holds the gudgeon pin from coming out, had worked loose, and finally found itself playing about the bearings, until the fatal moment came, when it jammed itself between the connecting rod and the flywheel. It was so fast that I had to cut it out with a hammer and chisel. Luckily, no harm was done, but it has been a lesson to me.

G. H. MARSHALL.

VALVE TIMING.

Sir,—The following method of timing a lightweight four-stroke may interest your readers. The advantages are no blow back through carburetter and exhaust noise greatly reduced.

Timing.—Exhaust opens at twenty-nine minutes past and closes at five past. Inlet opens at seven minutes past and closes at twenty-two minutes to. This is an attempt to follow what has been described lately as aeroplane practice, *i.e.*, late opening of inlet valve, and is successful as above with no disadvantages that I can see.

R. L. BOYD.

ARMY MOTOR CYCLES AFTER THE WAR.

Sir,—As unfortunately I have not had the pleasure of reading your estimable journal for a considerable number of moons, I do not know if any suggestions have already been made regarding the after-war disposal of the many bicycles which have done admirable work and which will no longer be required for military purposes.

However, may I make the suggestion that these only be sold to members of H.M. Forces (wearers of the wound stripe to have first choice)? I should be glad to know the views of others on this matter.

Douglas, Triumph, and P. and M. machines are doing marvellous work on shocking roads here.

Macedonia. J. H. MORTON.

A TRIBUTE.

Sir,—Having seen so many letters in your valuable paper relating the merits of various machines, I would like, with your permission, to add my humble one.

I have had various makes of machines, but since the war mostly Triumphs, which I must say "never let me down."

I am in charge of a Motor Despatch Riders' Section attached to a war station, thirty miles from a railroad, and situated in a mountainous district. Our "trusty 'buses" (Triumphs) average seventy miles per day over those mountain tracks, and after a mileage of 11,000 they have recently been passed "in perfect condition."

I must say there is room for improvement in the mudguarding, which I consider is not adequate, and I hope the makers are considering this for their future models; otherwise, the little Triumph is perfect in every detail, as the manner in which it stands the great test to which it is being subjected in this war sufficiently shows.

GEO. I. P. GROGAN (Sgt.), Despatch Rider, R.E.

STEAM MOTOR CYCLES.

Sir,—As a reader of your valuable journal for many years past, I have recollections that a few descriptions and illustrations of attempts to produce a steam-driven motor cycle have appeared therein. Now that it is so difficult to obtain petrol, does the steam-driven motor cycle offer any solution of the problem, in the use of a lower grade oil, or acetylene, for the purpose of raising steam?

It is at once evident that there are many difficulties to be overcome, but are these difficulties, in the opinion of expert engineers, insurmountable? If it is not possible to construct a solo machine, will the sidecar machine meet the case, by arranging its chassis to contain the boiler?

The many advantages, other than that of fuel, are, I think, well worth consideration. It would be very interesting just now to hear from an engineer who has studied the matter whether or not it is likely that such a machine could be produced—one that would have a good chance of being successful commercially.

STEAM.

A LAMINATED SPRING SYSTEM FOR THE REAR WHEEL.

Sir,—In your issue dated February 7th you illustrate a spring frame designed and patented by Pte. Markham. If this gentleman, and other interested parties, will turn up your issue of May 17th, 1917, they will see therein described an account of an actual road test carried out by *The Motor Cycle* staff with a spring frame Brough. This spring frame was designed in 1915.

GEORGE BROUGH, A.M.I.A.E.

LIQUID AIR AS A MOTOR FUEL.

Sir,—We have noticed from time to time references in your paper to the possibilities of using liquid air for the propulsion of motor vehicles.

Without wishing to discourage any further attempts in this direction, we would like to say that, although it is possible to drive an engine by means of liquid air, and that it has, in fact, already been done, anyone with a knowledge of the physical properties of liquid air can by a very simple calculation readily convince himself that it is not an economical proposition.

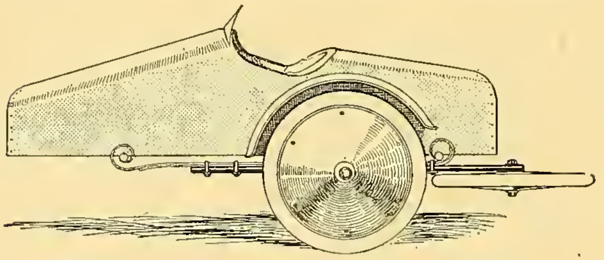
Should, however, any of your readers feel inclined to investigate the subject, it may interest them to know that liquid air is obtainable at our works at 10s. per gallon.

THE LIQUID AIR AND RESCUE SYNDICATE, LTD.

A CHEAP SIDECAR.

Sir,—I am forwarding a rough sketch of a sidecar body that I built for a friend of mine just previously to going as a D.R. to the Front, whence I am now home on fourteen days' leave.

I might mention that the body was built, painted, and upholstered within six days, and that my friend has used it in all weathers. He has now fixed it up for "gas bag stunts"!



A home-built sidecar produced at a cost of 19s. 5d.

The chief items of interest are strength, lightness, and comfort. It is also very roomy, and is fitted with a celluloid windscreen; thus the passenger is right down out of all wind. The cost amounted to 19s. 5d. The following are some of the chief particulars: Length, 6ft. 3in.; height, front 14in., back 10in.; inside, front at cockpit 20in.; inside, back at cockpit 17in.; leg space from seat back, 4ft. It was painted black, upholstered in green, and made of two sheets of three-ply, with ash and deal framework.

GEO. F. C. SAUNDERS.

GOODS MADE IN GERMANY!

Sir,—I do not know if I am quite qualified to ask for space to air my views on the above subject, as I am not a motorist, my connection with your paper consisting of sending it weekly to a B.E.F. D.R.

Long ago my wife and I agreed to have no further dealings with Germany, but we shall need the encouragement and assistance of British manufacturers to carry it out, whilst also being prepared ourselves to make some sacrifice.

My object in writing, however, is to call attention to the subject of hotels, which depend so much upon the patronage of automobilists. Many of these hotels, as everybody knows, were owned, managed, and staffed, before the war, by gentry bearing such names as Kopp, Kaiser, Bauermaister, etc., etc., and unless something is done to prevent it some of your correspondents who have written expressing approval of your action will some day find themselves actually putting up once more in uncongenial company.

I suggest, therefore, that a register be kept of all hotels from which the German element is eliminated, and a black list of those "under suspicion."

The Automobile Association and Chauffeurs' Society, wor
ing upon the same lines, could practically exterminate u
desirable alien drivers, both public and private, and the
is plenty of scope in many other directions for energet
people who mean business.

M. J. HAWKINS.

Sir,—I am writing to ask you not to waste any more
your valuable space by continuing the correspondence
goods made in Germany. No sane-thinking person could
of any other opinion than that of the publishers of *T.*
Motor Cycle, and I consider it a waste of time to argue t
matter further. Whatever a few readers may think, I a
sure the publishers will not deviate from the course whi
they have decided to take.

I think I may claim to have a slight knowledge of t
German as he is, and not as some people appear to thi
him, as I was interned in a German camp for a considera
time.

People like Tom E. Tanner talk of shaking hands wi
the Hun after the war, and treating him like a brothe
One agrees nothing is finer than the spirit in which t
sportsmen will shake hands after a fight, but to shake han
with the Hun would be like shaking hands with, say, a c
whom one had knocked down for bullying.

A. ARNOLD.

Sir,—I would like to say a word about your admira
notice *re* Hun trade. If everyone in this country adopt
a similar attitude toward the unmentionable Hun, we wou
be assured of a cleaner air in our trade circles after t
war. Who will be able to shake hands with a Hun aft
the war without staining himself with the taint of filt
barbarity, which must cling for ever to these disgusti
outlaws of every decent feeling, every code of honour, a
even the sportsmanlike instinct of a common mongrel do

Snivelling remarks are heard on many occasions fr
weaklings who have not the grit or common courage
our gallant men in the field, or that grim purpose whi
made the Englishman the most successful man in all t
past great struggles.

America recognises the truth of this in her public li
and she has no use for half-hearted citizens who reta
everything by their weak interference. An army officer w
dared to show sympathy for the Hun in America was giv
twenty-five years' imprisonment last week. That is the w
to treat such traitors. Will our people ever be efficie
in the running of such vital matters? I think not—un
they are badly bitten by the parasites who write sympath
ing with the unutterable Hun.

Let us win the war, and then talk over things with the
poor degenerates; for we English are over-charitable a
just, and I am sure we shall never summon up enou
decision to "out" the traitors who seem to have such
hold on our national interests.

JOHN G. GRENFELL.

[Now that readers of various shades of opinion have had
say on this matter, this correspondence must be close
We may say that the great majority of our corresponden
have been wholeheartedly in favour of our policy, whi
has been followed by many other journals.—ED.]

CARBURETTER ADJUSTMENT.

Sir,—I read with particular interest some notes whi
appeared a few weeks ago in your esteemed journal o
the *nom-de-plume* "Triumph," which dealt with t
experiences that particular correspondent has had with t
Binks carburetter.

My interest lies in the fact that I, too, have failed
solve the question of satisfactorily running on the *main* j
of this carburetter. I may say that I have not fou
the slightest difficulty in obtaining flexibility, slow runni
or acceleration—up to a point, of course, as far as pow
output is concerned—from the first and second jets; b
attempt to do more than "smell" the main jet, and t
game is up immediately.

I have persistently for over a year worked to overco
this difficulty by all manner of juggling with the sizes
jets in a single-cylinder 86×86, and also a 90° twin of t
same dimensions of cylinders, but I am just as near succe
to-day as when I started. Strange to state, the nearest
satisfactory results from the main jet that I have got h
been with 0, 3, 5, but this only extends to even runni
and, of course, with such a small main jet the pow
would be better described as "donkey" instead of "horse
It will be needless for anyone to inform me that I ha

failed to do so and so with the bottom air holes. I am quite conversant with the fine points of the instrument, also I know all about air leak, etc., and it is just for these reasons that I am disappointed.

The twin engine appears to take more kindly to the Binks than the single, and I myself take kindly to the carburetter on account of the undoubted controllability of the machine it offers when in traffic and on the smaller jets, but I should like very much to read some other user's experience.

I am not, it will be noted, making any complaint regarding the half wineglassful of petrol which is invariably wasted when changing jets.

The maker issues instructions, which I have studied carefully, of how to overcome any and every difficulty, but somehow they all appear to fail when tried with the main jet.

H. A. CONNELL.

PETROL FOR SOLDIERS.

Sir,— I am writing you with reference to the granting of petrol permits to men on leave from the B.E.F., etc.

I came on leave about three weeks ago, and lost a whole day in London in order that I might call on the Petrol Control Board. After filling up "umpteen" forms I was granted the paltry allowance of two gallons for motor cycle and sidecar. Surely something can be done to raise this allowance.

C. A. S. THORNTON.

Sir,—I am at present in a convalescent hospital, and thought it might interest some of your military readers to know that a permit to obtain and use petrol can be obtained from the Petrol Control Committee, if unable to reach home from the hospital by any other method.

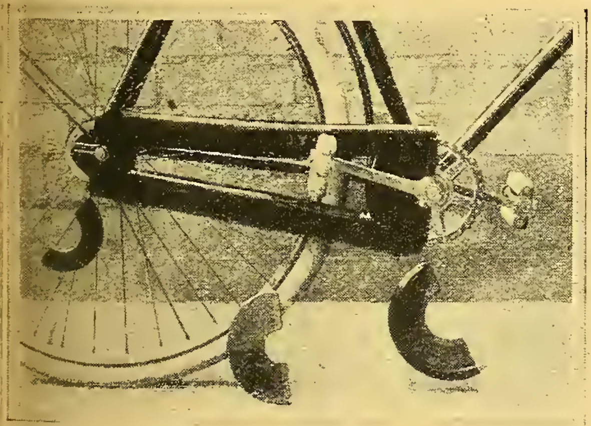
I applied for a permit, and was much gratified at the very prompt way my application was dealt with. I have been allowed two gallons per month for two months, and this will enable me to reach home every Sunday.

It was through your answer to my letter *re* granting permits to men, as well as officers, on leave or convalescent that I put my case forward, and I wish therefore to offer my thanks to the "Blue 'Un," which I shall continue to take as usual whatever the price, and I am quite sure your military readers will all support your much discussed "Goods made in Germany" notice against the attacks of Mr. Chas. S. Ives and his "Conchy" supporters.

SGT. H. OWITZER, D.R., R.G.A.

CHAIN CASES.

Sir,—With reference to the Limana chain case, described on page 177 of *The Motor Cycle* for February 21st, you may be interested to learn that nearly twenty years ago I embodied this idea in a pedal cycle frame, which was built by Messrs. Humber, Ltd., at their Lower Ford Street works, Coventry.



Showing a tubular construction which formed the chain struts and gear case of a machine made many years ago.

If my memory serves me rightly, the machine was finished during the twelve months following the disastrous fire at these works, and while Mr. Alexander Craig, who was my successor, was works manager.

T. W. BLUMFIELD.

LUBRICATION IN INTERNAL COMBUSTION ENGINES.

Sir,—Under the above heading in your issue of February 7th you publish a letter from F. Strickland, which contains statements that are obviously absurd.

One of these is to the effect that he knows of an internal combustion engine "which was running perfectly after seventeen years' continuous work, during which time the main bearings were never adjusted and the bottom ends only once," and continues to the effect that "owners often scrap these engines in perfectly good condition (?) to make way for a more modern type."

Any engine that had done so much continuous work on such little attention would have been fit for the scrapheap many years ago.

After long experience of both land and marine types of steam and internal combustion engines by the best builders, I must say that no engine ever constructed could possibly do anything approaching such a performance.

His remarks as to the constant reborings of steam engine cylinders are also exaggerations. I have sailed in a vessel the engines of which were thirty-two years old, the cylinders of which were never rebored in that time, and were never lubricated, and yet were perfectly circular, and the working faces of both valves and cylinders were glass hard—too hard, in fact, to be marked by a file. Perfect surfaces such as these are common in all large steam engines after a few years' careful running.

Internal combustion engines as fitted to motor cycles, etc., with their haphazard oiling systems and exposed working positions, could certainly never hope to equal the life of large slow-speed engines with positive lubrication (such as are in use for electric generating plants, etc.), and working in specially constructed buildings, with constant attention. Still, they never run the period your correspondent claims without many overhauls.

RAYMOND W. SHIMMINS.

RECORD SPEEDS.

Sir,—I was pleased to read in the paper I am now taking for the time being, the *Daily Mail*, the following table:

Light and electric telegraph	186,000	m.p.s.
Shell near muzzle 6in. gun	2,500	ft.p.s.
Shell from 75 mm. gun	1,600	,,
Sound	1,100	,,
Revolver bullet near muzzle	500-800	,,
Tip of blade of airscrew	400	m.p.h.
Fast aeroplane	150	,,
Fast aeroplane with high wind ...	200	,,
Fast motor car	120	,,
Express train	80	,,
Fast steamship	40	,,
Bicycle (pedalled)	32	,,
Racehorse	30	,,
Man skating (for a mile)	24	,,
Man running (100 yards)	20	,,
Man running a mile	13	,,
Man walking	4	,,

I realise, of course, that one cannot get to New York on a motor cycle, nor for that matter by an express train or a fast motor car. At the same time I am surprised to note no mention is made of our dear pal the motor cycle, and to any keen and enthusiastic motor cyclist it is something one cannot understand. Comparisons on speed are made in regard to the fast motor car, the express train, etc., but the fast motor cycle is not given a show. It is all the more surprising when one reads that the lecture was given by so eminent a person as Col. Mervyn O'Gorman, and when one realises to-day how many flying men were previously keen and enthusiastic motor cyclists. Why the motor bicycle has been omitted in making these comparisons is something we should all like to know. At the same time I may be excused when I say I think it would be very hard indeed to find a pedal cyclist who could do 32 m.p.h., though it may have been done. I was wondering whether between the fast motor cycle and the pedal cyclist there should not be the fast motor cycle which has beaten an express train, and should therefore take its place correctly between the fast motor car and the express train. I trust you will pardon my writing you lengthily on this subject, but I feel that my dear old friends should have a place in this comparison of speeds.

P. J. MACREADY.

[A motor cycle has exceeded 100 m.p.h.—ED.]

LITTLE SKETCHES IN PRE-WAR FRANCE.

III.—ROUEN AND HOME AGAIN.

AFTER a week of kaleidoscopic sight-seeing (the long galleries of the Louvre, the mechanical naughtiness of the Bal Taberin, the chill dignity of Napoleon's tomb in the Invalides, the Luxembourg statue wreathed with *immortelles* in remembrance of the lost provinces, Puvis de Chavannes paintings, and delectable meals in odd forgotten corners of Paris) our little Douglases were dragged from their obscurity in the rear of the wine shop, and on a fine Sunday morning we set out for St. Germain to view Paris from the famous terraces. A rough road and an uneventful trip, save for the protests of a *gendarme*, who objected to our deserting the atrocious *pavé* for the path, in the face of the fact that there was no "*Piste cyclable*" notice up. We placated him, and continued as before, little boys scurrying in front of us crying, "*Gare au velo!*" at the top of their voices. St. Germain is a quaint little mediæval town. While my friend was photographing a church interior I was accosted by a "*chemineu*" (beggar), who desired tobacco. He was spotlessly clean, but his clothes were worn to the bitter end. I told him I could almost envy his untrammelled life. He replied that the romance of it evaporated in the winter months, that he was getting old, and that his teeth hurt him, and he was going to have them pulled out by some itinerant at the fair by Sannois. He quoted Pascal at me—"*A la fin, on mourra seul*" ("At the end, one will die alone")—and gratefully accepted the tobacco of the English and such small help as I could offer him.

In the boulevard, Champs Elysées, Paris. The agencies of Messrs. Humber, De Dion Bouton, and Hotchkiss are situated in the beflagged block of buildings.

From Paris to Rouen.

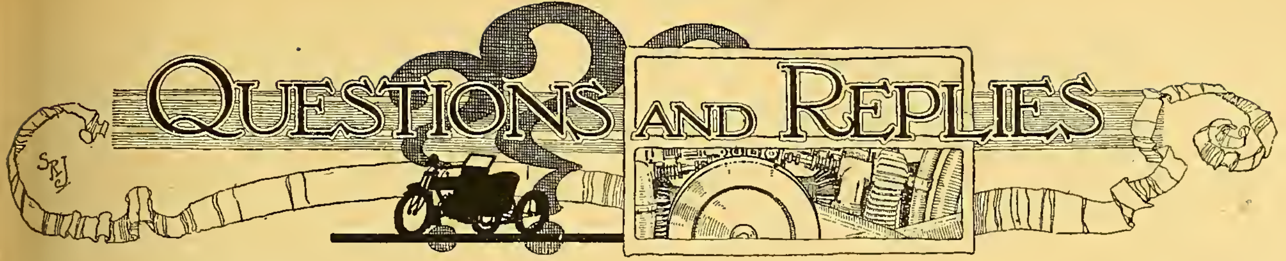
We came back from St. Germain by some tortuous route through Mesnil le Roi, and got most wonderfully lost, finishing up at a farmhouse, where we were royally entertained for a very small sum (in happy distinction from the sharks of Paris, who had bled us unmercifully on many occasions). The time passed all too quickly, and at last we had to think of the return journey. We decided to go by Rouen, one of the loveliest of old-world cities, and break our journey there. For the first few miles out of Paris the roadsides were placarded with advertisements of Hutchinson and Michelin tyres and the ubiquitous Rudge-Whitworth wire wheel. The road was all against us, long dragging rises and short, sharp descents. The villages through which we passed were gaily decorated, as to-morrow was the great Nation *fête*, the Quatorze Juillet, when everybody celebrat the taking of the Bastille, and nobody does any wo at all (always excepting the *café* proprietors, wl never seem to close, their zinc-topped tables alwa covered with brightly-coloured liqueurs of a heac nature). After sixty miles or so of rather ha driving, we slipped down one of those amazing ar rather terrifying hairpin hill roads to which the Fren are rather given, and which return to haunt you nightmares, and picked our way delicately along t quay *(pavé!)* to the C.T.C. hotel.

The National Fete.

After supper we went out on to the streets, all up by torchlight, and watched as fine a milita procession, accoi panied by mu as gay and infe tious, as you cou imagine. After th we bestrode roun abouts, a peculiar vertiginous varie (the French have use for anythi that does not mo quickly), and gene ally took in the f of the fair. T press of the crov (and perhaps t wandering eye of would-be demu damsel in a swir was responsible f my losing the coi pany of my frie for the remainder of the evening. I shall not t you how I consoled myself, but he has never be able to convince me that it was not he I saw later a paper carnival hat pressing a vivacious daughter France to more ice-cream cones.

The next morning the clamorous church bells awo us in the small hours. You begin your *fête* day ea in France, and get value out of it. We went to vi the Place, where the crazy gabled windows look down on the smouldering body of the Maid of Franc It is difficult in a moment not to realise a little of t tragedy. In those old streets the centuries close o one. And the cathedrals! To attempt to descri them would be a profanation. Ruskin's rather hac neyed definition, "frozen music," comes somewh near it—such shape might Beethoven's 27th Son take.

All things come to an end, so behold us at last huddled on the lee side of a light racing returning from the tourney, our little machines stow below. The immigration officer comes round as near the white cliffs, "Are you a Breetish subject Yes, we are home, and so till better times good-bye the "pleasant land of France."



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

The Driving Licence.

I drive a motor cycle carrier combination for a tradesman, and my driving licence will need renewing in a short time. Ought my employer or ought I to pay for the renewal? If he does, should the licence be made out in his name or in mine?—G.S.M.

This is a matter for private arrangement between yourself and your employer. You will have to make the application yourself, and enclose the 5s. fee with your application, but whether or not your employer reimburses the sum is, as we have said, a private matter lying between you and him. The licence, of course, must be taken out in your name.

Irregular Running.

I have a 3 h.p. twin 1914 Royal Enfield. The front cylinder was cracked, welded up and replaced, but the compression differs in the two cylinders. That in the front cylinder is good, but in the rear cylinder it is excellent. (1.) At almost all speeds, and even when running on the stand, the front cylinder fires through the silencer (*i.e.*, intermittently allows popping in the silencer). (2.) Although the carburetter and control appear good, I am unable to shut right off. (3.) Oil persistently exudes from the front cylinder head. Please tell me the cure for these troubles. I also have a 4 h.p. single-cylinder 1912 Bradbury, and have fitted a new Amac carburetter. It is a single-speed machine, and whether ridden solo or with sidecar will sometimes climb a stiff hill but stop as soon as it is over the top. Will you please tell me the reason?—W.C.

1-3.) The fact that oil is exuding from he front cylinder seems to indicate that his is not firing properly, and that oil is working past the piston rings; also, that he inlet dome is not a gas-tight fit. This could also account for the difference in he compression of the two cylinders. Are you sure the trouble is not due to warping as a result of unsatisfactory welding? The popping back may be due to too weak an inlet valve spring, or to he tappets requiring adjustment. (2.) Obviously your throttle control wire is oo short, and does not allow the throttle o close properly, and it is quite possible that the trouble might be cured by adustment. The trouble with your 4 h.p. ingle-cylinder, single-geared machine is most probably pre-ignition, due to the use of a plug the points of which project oo far into the cylinder and become ncandescent.

Failure to Start when Warm.

Can you please tell me why my $4\frac{1}{4}$ h.p. motor bicycle will not start when the engine is hot? I can get it to fire about two or three times, and then the machine will stop. The magneto is perfectly all right, and the engine was overhauled not very long ago. When cold the engine starts easily.—T.P.

We have come across similar symptoms before, and have found them very difficult to explain. It is just possible that the trouble is due to the carburetter being adjusted on the rich side, and the mixture is too rich for the engine to start when warm, or to condensation on the plug points.

Lightening a Piston.

I have had a new piston made for the rear cylinder of my 1911 Douglas. It weighs 1 oz. 7 drms. more than the old one. Will this have any effect on the running or wear of engine? If so, in what way? I have already drilled holes in order to reduce the weight.—A.S.

We should recommend you to drill further holes in the piston, so that the weight is the same as that of the original one, otherwise the balance of the engine will be upset. We should also recommend you to take expert advice, which should be available to you as you are in the R.F.C., as to the method of drilling the piston so as not to weaken it. We cannot well advise you, as we do not know exactly how you have already drilled the piston.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restriction on the import of paper and paper making material is very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week.

High Petrol Consumption.

I am very dissatisfied with the petrol consumption of my 1916 6 h.p. and sidecar. I only get 45 m.p.g. I have a hot air intake, a copper jacket round the flood chamber and on to the cylinder, and the induction pipe lagged with asbestos string. I usually run without passenger. The timing has been repeatedly checked, and the valves trued. The jet is as fixed by the makers, and is the size recommended by the carburetter makers, and there is no popping back; still the consumption does not improve, although I am told by friends of mine that they get 65 and 70 m.p.g. on a similar machine.—H.A.W.

We think that the trouble is due to your using too large a jet. Though the existing jet is that recommended by the makers, you have not taken into consideration the fact that you are using a hot air intake, and, consequently, we feel confident that the engine will stand a smaller jet with this device, this being one of the advantages which should accrue through using it. Petrol consumption is also largely a matter of driving.

Electric Lighting.

I have a $2\frac{3}{4}$ h.p. Douglas engine used as a stationary unit driving a generator for a technical branch of the Royal Engineers. I am eager to fit up some sort of electric lighting set by which to light us up when working by night, as we often do, and I thought you might know of a dynamo-accumulator set which I could run from the engine, charging the accumulator by friction drive from the Douglas flywheel. The engine only runs for short periods of about five minutes at intervals, never for long periods together. Can you suggest a lighting set for these conditions? As a motor cyclist, I always use acetylene lighting; but has not some electric lighting set been evolved, such as I require?—F.R.

There are frequent advertisements in *The Motor Cycle* of such a set as you require, but whether the makers will be able to supply at the present time we cannot say. Personally, we should be very much inclined to doubt if any dynamo lighting set containing accumulators also could give satisfactory service, if it were being driven by an engine at short intervals only. However, the makers of whatever set you choose would give you full information on this point, and we should certainly place these circumstances before them and secure their opinion.

Poor Compression after fitting New Rings.

I should be much obliged if you could tell me what is wrong with my $3\frac{1}{2}$ h.p. single-cylinder. I recently had new piston rings fitted, and on assembling the engine I cannot get good compression. It will fire regularly enough, but will not pull. I have thoroughly examined the crank case and cylinder, also the valves, and cannot find any leakage. Is it possible that the air is blowing back past the rings?—L.U.U.

Possibly a new piston is required as well as new rings. Also, the new rings would require to be run in for a short time. Of course, it is possible that the ring slots may be in line owing to faulty assembling, and if this is the case you cannot get compression. After a little running they may perhaps re-arrange themselves.

Removing a Refractory Nut.

I should be much obliged if you would kindly tell me which is the best way to move the lock-nut on a 1914 Triumph adjustable pulley. I have tried to move it with the valve cap spanner and a mallet, but without success. I believe it is a right-hand thread on the nut and a left-hand thread on the pulley flange. Is this correct? I wish to reduce the gear, as at present it is $3\frac{5}{8}$ to 1 (top ratio), which is too high for winter riding.—W.H.B.

You are proceeding in the right way, and if you persevere you should be successful in removing the refractory nut. First try running some paraffin around the thread, then get a piece of rope or cord and wind it twice round the pulley, fastening one end and getting someone to hold the other so as to prevent it from turning, and after a few sharp blows with a heavy hammer the nut is bound to come undone. Evidently the thread must be rusted up and the nut is jammed. When the nut has been removed, the thread should be well greased. The gear is too high for any kind of riding, not only for winter work.

Scott Queries.

I have recently purchased a Scott motor cycle, but I cannot get it to start. Both plugs spark well when taken out of the cylinder, so I do not think the fault is in the magneto. The carburetter is a Binks, and I generally adjust the throttle one-third open when trying to start. (1.) With a vigorous kick I can push the starter right down without holding up the compression release. Is this in order? (2.) I took out the throttle and flooded the carburetter, and the petrol just came over the top of the jets. Should it spurt over the top of the jets? (3.) How can I test the magneto timing? (4.) How should I adjust the carburetter for starting?—C.P.A.

(1.) Yes. (2.) Yes. (3.) Set the contact breaker at two-thirds retarded, then revolve the engine until one piston is exactly on the top of its stroke. The make and break arms of the contact breaker segment for this cylinder should then be just separating. (4.) If the carburetter is a single-lever carburetter, the throttle should be about one-third open; if it is a double-lever carburetter, the throttle should be about one-third open and the air closed, but individual engines often require a slight modification of this arrangement. Thus, while some engines will only start if the throttle is rather more than half open, others will only start if it is open just a shade. All depends upon the main air supply, and we should imagine that this is the probable cause of your trouble. Try larger and smaller choke tubes.

A Broken Piston Ring.

(1.) I have a 1915 $2\frac{3}{4}$ h.p. Calthorpe-Jap, and would like to know why the inlet valve, spring, and tappet become so hot as practically to scorch up the frequent injections of oil which I have to give it. Is there any remedy for this? (2.) One of the two piston rings has become broken, and a piece about $\frac{3}{4}$in. long is missing. I cannot trace any sign of it in the cylinder, and take it that the broken piece has found a resting-place somewhere in the crank case. Would this explain a certain amount of loss of power which the engine has developed lately? (3.) I wish to take off the fixed Dixie magneto for cleaning, etc., but cannot move the nut holding the first timing cog. In what way can the remainder of the pinions and the engine be held rigid to enable me to remove the nut in question?—E.B.S.

(1.) It is quite impossible to prevent the inlet valve spring and tappet from becoming hot, because they are so close to the combustion chamber that the heat is naturally conducted to them. (2.) As to what has become of the broken piece, it is quite impossible to say, and you cannot tell if this is the source of the loss of power without taking the engine down and examining every part. (3.) It is best to prevent the engine from revolving by holding the back wheel pulley, or by some other convenient method, and putting a fairly long spanner on the nut, and then giving it a series of sharp taps with a hammer, when the nut should come undone without any trouble.

Flash-points.

Can you please give me flash-points of (1) petrol, paraffin, (3) hydrogen, and carbon monoxide? Also, are last two named gases suitable use in motor engines of high speed H.V.H.

As petrol and paraffin are both mixtu of other substances, it is difficult to ass to either of them a definite flash-poi That of petrol, however, may be tal as somewhere in the region of the fre ing point of water, while that of para may be about 150° Fahr. We do understand what you mean by the fla points of hydrogen and of carl monoxide, but the ignition temperatu of these two gases are about 580° C. hydrogen, and from 637° to 658° C. carbon monoxide. Hydrogen may be u as a fuel, but would be very expensi As regards carbon monoxide, this co possibly be used in theory, but we do think it would be a success in pract

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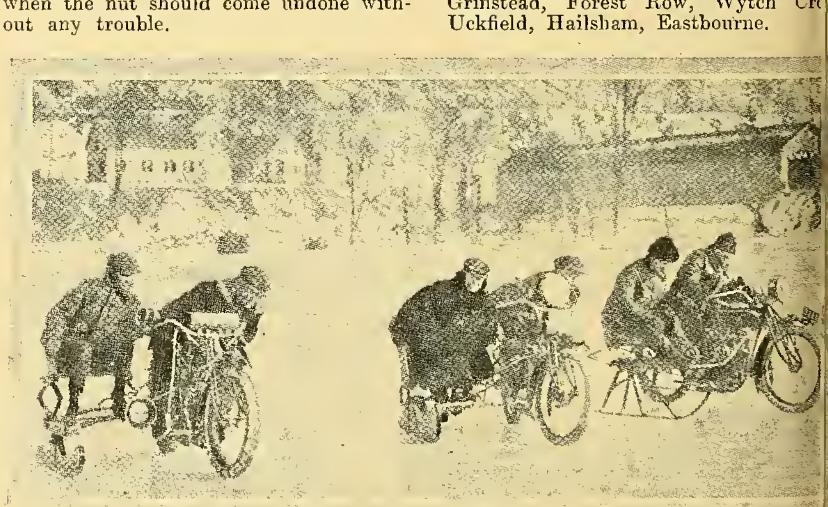
RECOMMENDED ROUTES.

NEWCASTLE TO CARDIFF.—A.H.

Newcastle, Chester-le-Street, Nevil Cross, Darlington, Northallerton, T cliffe, Boroughbridge, Wetherby, At ford, Ferrybridge, Doncaster, Works Mansfield, Nottingham, Long Eat Ibstock, Hinckley, Coventry, Warwi Stratford-on-Avon, Weston-sub-Ed Broadway, Winchcombe, Cheltenha Gloucester, Newnham, Chepstow, N port, Cardiff.

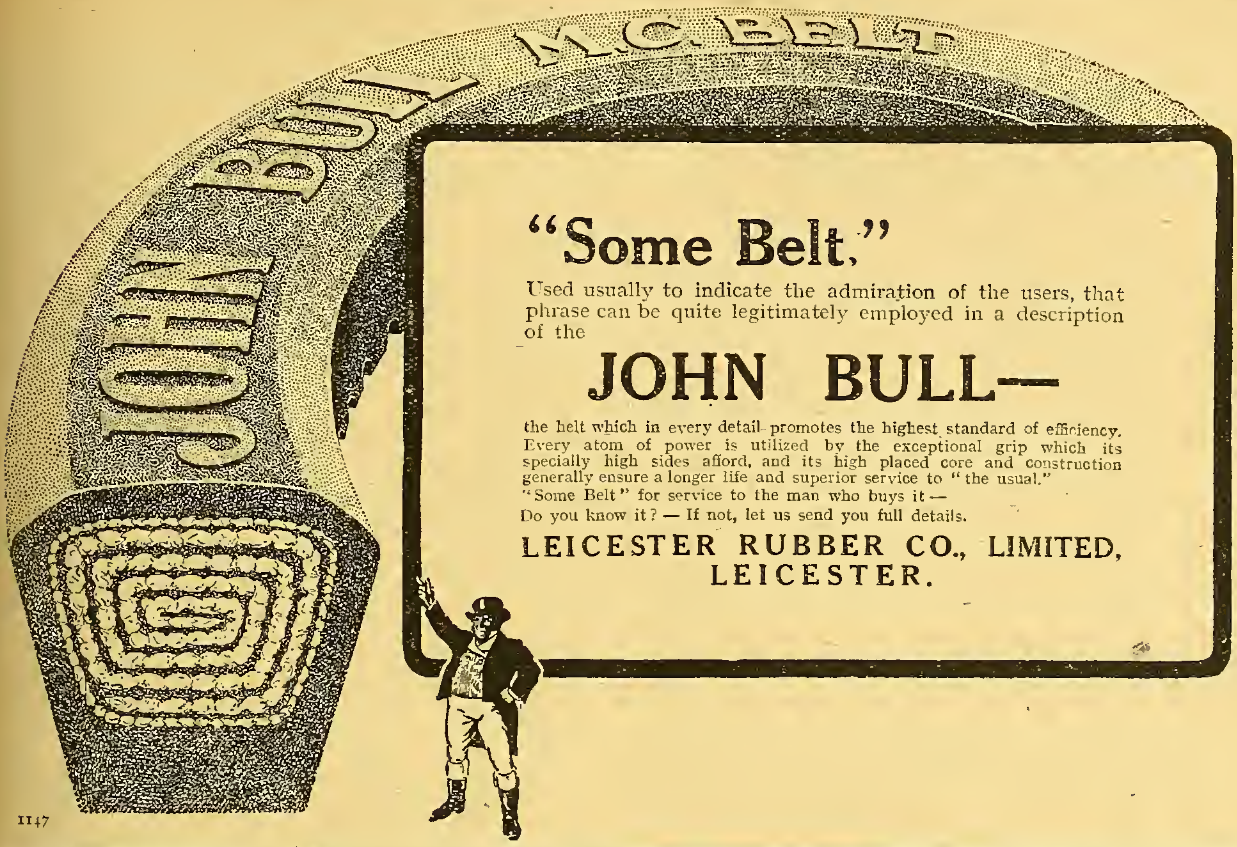
CAMBRIDGE TO EASTBOURNE.—H.F.F.

Cambridge, Fowlmile, Barley, H Street, Puckeridge, Ware, Cheshu Waltham Cross, Edmonton, Tottenha Stoke Newington, Dalston, straight down Norton Folgate into Bishopsga through Gracechurch Street, past Monument Station on to London Brid then continue along Borough H Street, Newington Butts, Kenning Road, Brixton Road, Streatham, N bury, Croydon, Purley, Godstone, E Grinstead, Forest Row, Wytch Cr Uckfield, Hailsham, Eastbourne.



SIDE SLEDGING.

American motor cyclists enjoying a novel form of sport on the river Connecticut. The wheels and body of the sidecar have been removed and runners with spring seats attached in their place. (*Motor Cycling and Bicycling*, Chicago.)



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SELECTION FROM STOCK:

SECTION "A." Lightweight, 2 and 4-strokes not over 3 h.p., for solo use.

1.	**ALLON,** 1916, 2-stroke, 2-speed	25 gns.
2.	**BRITISH EXCELSIOR,** 1916, 2-stroke, 2-speed	25 gns.
3.	**CALTHORPE-J.A.P.,** 1915, 2-speed, clutch	21 gns.
4.	**CALTHORPE-J.A.P.,** 1916, 2-speed, clutch, sloping tank	26 gns.
5.	**CALTHORPE,** 2-stroke, 2-speed, clutch, 1916	23 gns.
6.	**COVENTRY EAGLE,** 1916, 2-speed, 2-stroke	25 gns.
7.	**CRESCENT,** 1917, 2-stroke, 2-speed	27 gns.
8.	**CLYNO,** 1915, 2-stroke, 2-speed, clutch	22 gns.
9.	**CONNAUGHT,** 1915, 3-speed, clutch, pedal-start	24 gns.
10.	**DALM,** 1917, 2-stroke, as new	19 gns.
11.	**DIAMOND,** 1916, 2-speed, 4-stroke, 2½ h.p.	26 gns.
12.	**DOUGLAS,** 1911, single-speed, 2¾ h.p.	18 gns.
13.	**DOUGLAS,** 1912, single-speed, 2¾ h.p., countershaft	19 gns.
14.	**DOUGLAS,** 1913, single-speed, 2¾ h.p., countershaft	22 gns.
15.	**DOUGLAS,** 1913, T.T., 2-speed, 2¾ h.p.	29 gns.
16.	**DOUGLAS,** 1914, T.T., 2-speed, 2¾ h.p.	33 gns.
17.	**DOUGLAS,** 1915, T.T., 2-speed, 2¾ h.p.	39 gns.
18.	**ENFIELD,** 1917, 3 h.p., 2-speed, clutch, kick-start., as new	44 gns.
19.	**ENFIELD,** 1915, 3 h.p., 2-speed, clutch, kick-start.	35 gns.
20.	**F.N.,** 2½ h.p., good mechanical order	9 gns.
21.	**F.N.,** 2½ h.p., 1913, 2-speed, clutch	17 gns.
22.	**HOBART,** 1915, 2-speed, 2-stroke	23 gns.
23.	**IVY,** 1915, 2-speed, 2-stroke	23 gns.
24.	**JAMES,** 1916, 2-speed, 2-stroke	28 gns.
25.	**METRO,** 1916, 2-stroke, sloping tank	19 gns.
26.	**NEW HUDSON,** 1916, 2-stroke, 2-speed	25 gns.
27.	**NEW IMPERIAL,** 1914, 2¼ h.p. J.A.P., 2-speed	19 gns.
28.	**NEW IMPERIAL,** 1915, 2¼ h.p. J.A.P., 2-speed	22 gns.
29.	**NEW IMPERIAL,** 1916, 2¼ h.p. J.A.P., 2-speed	27 gns.
30.	**NEW RYDER,** 1917, 2¾ h.p. J.A.P., 2-speed	27 gns.
31.	**N.S.U.,** 1913, 3 h.p., 2-speed, clutch, good order	19 gns.
32.	**N.S.U.,** 1914, 3 h.p., T.T., very fast	24 gns.
33.	**O.K.-J.A.P.,** 1916, 2¾ h.p., 2-speed, clutch	25 gns.
34.	**PREMIER,** 1914, 2½ h.p., perfect order	22 gns.
35.	**RADCO,** 1915, 2-stroke, as new	19 gns.
36.	**RADCO,** 1914, 2-stroke, 2½ h.p.	18 gns.
37.	**ROYAL RUBY,** 1915, 2-stroke	17 gns.
38.	**SHEFFIELD MINOR,** 1916, 2-stroke, sloping tank	19 gns.
39.	**SINGER,** 1914, 2½ h.p., clutch model	22 gns.
40.	**SINGER,** 1913, 2½ h.p., pedal-start	14 gns.
41.	**SPARKBROOK,** 1917, 2-speed, 2-stroke	26 gns.
42.	**T.D.C.,** 1917, 2-stroke, as new	19 gns.
43.	**VINDEC,** 1916, 2-stroke, 2-speed, as new	25 gns.
44.	**WOLF,** 1916, 2-stroke, as new	19 gns.
45.	**WOOLER,** 1915, 3 h.p., 2-stroke, 2-speed, spring frame	24 gns.

SECTION "B." Solo machines of over 3 h.p. These include all medium and heavyweight solos in stock suitable for touring and speed work. Many in this section will take sidecars, which we can supply from 2 gns

46.	**BRADBURY,** 1913, 4 h.p., 2-speed, clutch	21 gns.
47.	**BRADBURY,** 1914, 4 h.p., 2-speed, countershaft, kick-start	29 gns.
48.	**B.S.A.,** 1913, 3½ h.p., 2-speed, clutch, pedal-start	26 gns.
49.	**B.S.A.,** 1915, 4¼ h.p., 3-speed, all-chain, kick-start	43 gns.
50.	**F.N.,** 1913, 5-6 h.p., 4-cylinder, 2-speed, hand clutch	29 gns.
51.	**HARLEY-DAVIDSON,** 1915, T.T., 7-9 h.p., olive-green finish, disc wheels, electric lighting, 3-speed, clutch, kick-start	65 gns.
52.	**HUMBER,** 1912, 3½ h.p., 2-speed, clutch, handle-start	23 gns.
53.	**INDIAN,** 1914, T.T., 7-9 h.p., clutch, road racer	29 gns.
54.	**INDIAN,** 1915, T.T., 7-9 h.p., clutch, road racer	36 gns.
55.	**INDIAN,** 1915, T.T., 7-9 h.p., clutch, road racer, discs	37 gns.
56.	**INDIAN,** 1916, T.T., 7-9 h.p., clutch, road racer, as new	41 gns.
57.	**INDIAN,** 1914, 7-9 h.p., 2-speed, clutch spring frame	34 gns.
58.	**KERRY-ABINGDON,** 1914, 4 h.p., 3-speed, clutch Philipson	24 gns.
59.	**KERRY-ABINGDON,** 1913, 3½ h.p., 2-speed, clutch	21 gns.
60.	**KERRY-ABINGDON,** 1913, T.T., 3½ h.p., khaki finish	23 gns.
61.	**LINCOLN-ELK,** 1913, 3½ h.p., variable gear	19 gns.
62.	**LEA-FRANCIS,** 1915, 3½ h.p. twin J.A.P., 2-speed, all-chain	48 gns.
63.	**MARTIN-J.A.P.,** 1914, T.T., 3½ h.p., o.h.v.	24 gns.
64.	**MINERVA,** 3½ h.p., Bosch, B. & B.	11 gns.
65.	**MOTOSACOCHE,** 1914, 3½ h.p. twin M.A.G., Enfield gears	32 gns.
66.	**MOTOSACOCHE,** 1916, 3½ h.p. twin M.A.G., Enfield gears, as new	44 gns.
67.	**NESTOR,** 1914, 4 h.p., 3-speed, clutch, good order	24 gns.
68.	**NORTON,** 1914, T.T., Philipson	29 gns.
69.	**NORTON,** 1916, T.T., Brooklands model, service finish	48 gns.
70.	**NORTON,** 1918, 3-speed, big four, military model	78 gns.
71.	**PREMIER,** 1911, 3½ h.p., T.T., disc wheels	16 gns.
72.	**PREMIER,** 1913, 3½ h.p., 2-speed, clutch, pedal-start	24 gns.
73.	**PREMIER,** 1916, 3½ h.p., 3-speed countershaft, military model	44 gns.
74.	**PRECISION,** 1914, 4 h.p., variable Gradua gear, perfect	29 gns.
75.	**PRECISION,** 1914, 4 h.p., T.T., disc wheels	24 gns.
76.	**PRECISION,** 1913, 3½ h.p., 2-speed, clutch	21 gns.
77.	**PRECISION,** 1913, 3½ h.p., clutch model	19 gns.
78.	**REX,** 1913, 3½ h.p., T.T., Philipson	19 gns.
79.	**REX,** 1913, 6 h.p., 2-speed, clutch, handle-start	32 gns.
80.	**ROVER,** 1912, 3½ h.p., clutch	17 gns.
81.	**ROVER,** 1913, 3½ h.p., clutch	23 gns.
82.	**ROVER,** 1914, T.T. model, smart machine	29 gns.
83.	**RUDGE,** 1912, 3½ h.p., single-speed	17 gns.
84.	**RUDGE,** 1912, 3½ h.p., 2-speed, clutch	19 gns.
85.	**RUDGE,** 1913, 3½ h.p., T.T., Philipson, smart machine	24 gns.
86.	**RUDGE-MULTI,** 1913, standard, kick-start, 3½ h.p., clutch.	26 gns.
87.	**RUDGE-MULTI,** 1914, standard, kick-start, 3½ h.p., clutch.	32 gns.
88.	**RUDGE-MULTI,** 1916, standard, kick-start, 3½ h.p., clutch.	39 gns.
89.	**RUDGE-MULTI,** 1913, standard, 5-6 h.p., clutch, kick-start	29 gns.
90.	**RUDGE-MULTI,** 1914, standard, 5-6 h.p., clutch, kick-start	38 gns.
91.	**RUDGE-MULTI,** 1915, standard, 5-6 h.p., clutch, kick-start	42 gns.
92.	**SCOTT,** 1913, 3¾ h.p., 2-speed, clutch, kick-start	27 gns.
93.	**SUNBEAM,** 1916, 3½ h.p., 3-speed, as new	68 gns.
94.	**T.D.C.,** 1914, 4 h.p., 3-speed, clutch	24 gns.
95.	**TORPEDO,** 1913, 3½ h.p., clutch model	17 gns.
96.	**TORPEDO,** 1913, 3½ h.p., 2-speed, clutch	22 gns.
97.	**TRIUMPH,** 1911, standard	16 gns.
98.	**TRIUMPH,** 1913, T.T., very fast	23 gns.
99.	**TRIUMPH,** 1913, 3-speed, clutch, pedal-start, grey finish	29 gns.
100.	**TRIUMPH,** 1913, T.T., genuine 3-speed, clutch	29 gns.
101.	**TRIUMPH,** 1913, 2-speed, clutch, pedal-start	24 gns.
102.	**TRIUMPH,** 1914, T.T., 4 h.p., clutch, Philipson	32 gns.
103.	**TRIUMPH,** 1914, 4 h.p., 3-speed, clutch, pedal-start, perfect	34 gns.
104.	**ZENITH-GRADUA,** 1916, 4-5 h.p. twin, as new, T.T.	56 gns.
105.	**ZENITH-GRADUA,** 1914, 6 h.p., clutch, kick-start	42 gns.
106.	**ZENITH-GRADUA,** 1914, 4 h.p., as new	32 gns.
107.	**ZENITH-GRADUA,** 1913, 4 h.p.	27 gns.
108.	**ZENITH-GRADUA,** 1912, 4 h.p.	22 gns.
109.	**ZENITH-GRADUA,** 1913, 6 h.p., T.T.	31 gns.

SECTION "C." Sidecar Combinations. The majority of these can be split if required.

110.	**A.J.S.** 1916 de Luxe Combination, spare wheel	98 gns.
111.	**AMERICAN EXCELSIOR,** 1915, 8 h.p., 3-speed, sporting Sidecar	65 gns.
112.	**BAT-J.A.P.,** 1911, 6 h.p., 2-speed, cane Sidecar	21 gns.
113.	**BAT-J.A.P.,** 1914, 6 h.p., 3-speed, 2-seater Sidecar	42 gns.
114.	**B.S.A.,** 1915, coach combination, 3-speed	53 gns.
115.	**DOT-J.A.P.,** 1913, 6 h.p., 2-speed Combination, very fast	35 gns.
116.	**ENFIELD,** standard, 1916, 6 h.p. Combination	73 gns.
117.	**CLYNO,** 1915, de Luxe Combination, spare wheel	72 gns.
118.	**F.N.,** latest type, 7-9 h.p., 3-speed, coach Sidecar	72 gns.
119.	**HENDERSON,** 1915, 10 h.p., 2-speed, coach Sidecar, disc wheels	69 gns.
120.	**IVY,** 1915, 4 h.p., 3-speed, coach Combination	37 gns.
121.	**INDIAN,** 1916, 7-9 h.p., 3-speed, disc wheels, coach Sidecar	69 gns.
122.	**INDIAN,** 1915, 7-9 h.p., T.T., clutch model, coach Sidecar.	45 gns.
123.	**INDIAN,** 1914, 7-9 h.p., 2-speed, spring frame, coach Sidecar	42 gns.
124.	**KERRY-ABINGDON,** 1913, 3½ h.p., 2-speed, coach Sidecar.	25 gns.
125.	**MATCHLESS,** 1913, 6 h.p., 2-speed, good coach Sidecar	35 gns.
126.	**MATCHLESS,** 1915, 8 h.p., 3-speed, coach Combination	89 gns.
127.	**MOTOSACOCHE,** 1914, 3½ h.p. twin, 2-speed, clutch, kick-starter, coach Sidecar	37 gns.
128.	**MOTOSACOCHE,** 1915, 3½ h.p. twin, 2-speed, clutch, kick-start, coach Sidecar	44 gns.
129.	**NEW HUDSON,** big-six, 1915, 3-speed, chain-cum-belt, coach Sidecar	58 gns.
130.	**NEW HUDSON,** big-six, 1914, 3-speed, Watsonian Sidecar	45 gns.
131.	**PREMIER,** 1913, 3-speed Combination	32 gns.
132.	**PREMIER,** 1914, 3-speed Combination	36 gns.
133.	**PREMIER,** 1915, 3-speed Combination	45 gns.
134.	**PREMIER,** 1916, 3-speed Combination	49 gns.
135.	**REX,** 1913, 6 h.p., 2-speed, 1916 coach Sidecar	38 gns.
136.	**RUDGE-MULTI,** 1916, Millford Corvette Sidecar	49 gns.
137.	**RUDGE-MULTI,** 1914, 3½ h.p., underslung coach Sidecar	37 gns.
138.	**RUDGE-MULTI,** 1914, 5-6 h.p., sporting underslung Sidecar	37 gns.
139.	**RUDGE-MULTI,** 1915, 5-6 h.p., coach Combination	46 gns.
140.	**RUDGE-MULTI,** 1913, 5-6 h.p., underslung Sidecar	34 gns.
141.	**TRIUMPH,** 1914, 4 h.p., 3-speed, underslung coach Sidecar	44 gns.
142.	**TRIUMPH,** 1913, 3-speed, coach Sidecar	34 gns.
143.	**TRIUMPH,** 1913, 2-speed Combination	29 gns.
144.	**ZENITH-GRADUA,** 1913, 6 h.p., underslung Bramble coach Sidecar	38 gns.
145.	**ZENITH-GRADUA,** 1914, 6 h.p., Canoelet Sidecar, clutch, kick-start	48 gns.
146.	**ZENITH-GRADUA,** 1914, 4 h.p. Combination	34 gns.
147.	**WILLIAMSON,** 1915, 10 h.p., water-cooled, coach Sidecar, perfect	63 gns.

We can sell any machine or car by instalments, quarter down, balance to suit customer, we storing, insuring, and cleaning free till required. No extra charge is incurred by this method, which assures you of a machine ready for use when the end of the War, and the consequent shortage of machines comes. Write for full details. **Any machine sent on "The Motor Cycle" Deposit System.**

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rsons who hesitate to send money to unknown persons deal in perfect safety by availing themselves of our sit System. If the money be deposited with "The r Cycle," both parties are advised of this receipt.

e time allowed for a decision after receipt of the s is three days, and if a sale is effected we remit the nt to the seller. but if not we return the amount e depositor, and each party to the transaction pays ge one way. For all transactions exceeding £10 in a deposit fee of 2s. 6d. is charged: when under be fee is 1s. All deposit matters are dealt with at ntry, and cheques and money orders should be made le to Iliffe & Sons Limited.

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MOTOR CYCLES FOR SALE.

A.J.S.

S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Bath Rd., Exeter. [3520

S. 6h.p. Combination, 3 speeds, kick starter, ex- ellent order; £53, or good single part exchange; Kent.—Box 1,762, c/o *The Motor Cycle.* [X2549

S. Motor Cycles.—Immediate delivery of the very atest 6h.p. models from stock. — The A.J.S. lists, The Walsall Garage, Walsall. Tel.: 444. [X9872

S. 1916 6h.p. Combination, wind screen, Cape hood, luggage grid, storm apron, spare wheel, all interchangeable, 3 lamps, and many spares; £110, rest.—Baines, Upper House, Bury, Sussex. [3879

S. Motor Cycles.—Immediate delivery of special 1917 model, complete, detachable wheels, 700× res; £91/6; trade supplied; no permits required. J. Evans, Sole Agent for Birmingham and dis- [3711

6 4h.p. A.J.S., De Luxe sidecar, Triplex unbreak- able screen, side screens, hood, storm apron, side ns, luggage grid, locker, spare wheel, new Dunlop nation, one ditto, two 3-rib Hutchinsons on out- owey. C.A.V. electric lamps (accumulator), elec- and mechanical horns, done 2,400, good going cost £134, accept £80.—Hobbs, Chipping Hill, ead, Essex. [3861

Snap!

there goes the fastener and there you are hung up with a roadside repair and — more than irritated.

That's an occurrence which many a motor cyclist has experienced but —

It wasn't a

FORWARD

for the strength of the links in the fastener that bears that name renders them proof against breakage, and their unique construction and rollers that really roll, peculiarly immune from the wear that causes it.

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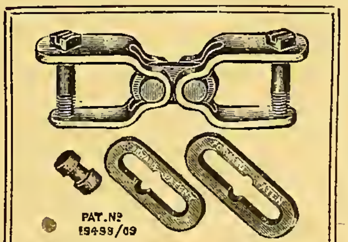
Forward Works,
Summer Row,
Birmingham.



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THE EUK EASY STARTER

It costs 21/-

Acts instantly. No matter how long motors have been out of service, a touch gives instant perfect easy starting. **Over 33,000 in use.** Details free from—

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Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

1916 4h.p. A.J.S., No. 8,078, with luxurious coachbuilt sidecar, spare wheel and tyre, hood, screen, 3 lamp sets, mechanical horn, Cowey speedometer, set tools, perfect order throughout; £85.—Robinson's Garage, Green St., Cambridge. [3957

A.J.S., 6h.p., and sidecar, with wind screen, lamp, and horn; this is one of the latest 1915 models turned out, as it left the works in October, 1915. The outfit has been thoroughly overhauled and revarnished, and is practically equal to new in every possible respect; price only 80 gns.—Julian, 84, Broad St., Reading. Biggest light car and motor cycle dealer in the South. 'Phone: 1024. Closed Wednesdays 1 o'clock. [0735

Alldays.

ALLON, 1915, 2-stroke, 2-speed, first-class condition; £25.—Off Licence, Great Barr, Birmingham. Birmingham. [X2588

ALLON, 2¾h.p., single, £38, new; 2-speed, £45, new; 2-speed and hand clutch, £48, new; 2-speed, £28/10; E.P., or exchange.—Service Co., 292, High Holborn, London. [X2617

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-speed countershaft models in stock. [1048

Auto-Wheels.

GENUINE Wall Auto-Wheel, little used, complete; £8/10.—Murray, 37a, Charles St., Hatton Garden. Holborn. [X1689

GENUINE Wall's Auto-Wheel; run 400 miles, owner leaving England; complete, £8.—Box L5,762, c/o *The Motor Cycle.* [3920

Bradbury.

BRADBURY 1914 4h.p. Combination, 2-speed, perfect condition; £30, or near offer.—102, Grove Vale, Dulwich, S.E. [3943

Brough.

BROUGH 1916 Model, 2-speed, including lamp; 45 gns.; this machine is one of the greatest bargains offered.—Julian, 84, Broad St., Reading. Biggest light car and motor cycle dealer in the South. 'Phone: 1024. Closed Wednesdays 1 o'clock. [0736

BROUGH, late 1916, 3½h.p., 3-speed Sturmey-Archer, h.b.c. clutch, kick starter, lamps, horn, speedometer, tools, good condition throughout, sound tyres, also 1917 c.b. Phœnix sidecar for same; £70.—Mansell 44, Howard Rd., S.E.25. [3929

BROUGH, 1915, 3½h.p., 2-speed countershaft, £42/15; 1916, 3-speed Sturmey-Archer countershaft, kick starter, hand clutch, P. and H. head and rear lamp, horn, Stewart speedometer, etc., £55, or with Watsonian sidecar, £65/10; E.P., or exchange.—Service Co., 292, High Holborn, London. [X2618

B.S.A.

B.S.A., 3½h.p., 2-speed, free engine, not used 18 months.—37, Sheet St., Windsor. [3669

B.S.A., late 1914, 4¼h.p., all-chain, countershaft, Speedwell sidecar, new tyres 650×65, spare new chains, Lucas lamps, never ridden in winter, fine condition; £50.—11, Sydenham Villas, Cheltenham. [3886

B.S.A., 1916, 4¼h.p., countershaft 3-speed, all-chain model H., in perfect condition, ridden only about 50 miles, together with No. 2 B.S.A. sidecar, in good condition; all at £60, or nearest offer.—Quartermaine, 2, West St., Maidenhead. [3933

Calthorpe.

CALTHORPE, 2¾h.p., 1915, 2-speed, 2-stroke; £20, worth £25.—Griffin, 89, Gt Portland St., W.1. [3935

MOTOR CYCLES FOR SALE.

Calthorpe.

1916 Calthorpe, 2-stroke, 2-speed, lamps, and horn, splendid condition; only £28.—Parker and Son, St. Ives, Hunts. [3949

NEW Calthorpe-Jap's, 2-speed gear models; price £39/18; easy terms arranged.—Wauchope's, 9, Shoe Lane, London. [3954

1916 Calthorpe-Jap, 2¾h.p., new tyres, Enfield 2-speed gear, spare petrol tank, horn, P. and H. lighting.—Borkett, 7, Hills Rd., Buckhurst Hill. [3932

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [3713

Chater-Lea.

3h.p. Chater-Lea, Eisemann, B. and B., thorough condition; £12/10.—G.R., 10, Anlay St., S.E.1. [3934

Clyno.

CLYNO, 1915, 2½h.p., 2-stroke, 2-speed, hand clutch, splendid condition; £25.—Ridge, Thorpe Terrace, Outwood, Wakefield. [X2545

FIRST Reasonable Offer for Clyno combination, late 1912, 5-6h.p., 2-speed, clutch, kick starter, spare tube and tyre, in good going order; neglected; suit tradesmen.—Andrews, 165, Lancaster Rd., Notting Hill. [3896

Connaught.

1915 Connaught, 2¾h.p., 2-speed, new tyres, lamps, Stewart speedometer, watch, all accessories, engine perfect; bargain, £25; owner returning to France.—Box L5,743, c/o *The Motor Cycle.* [3880

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

DOUGLAS, late model, or Harley, or Henderson combination.—Moorhouse, Bootmaker, Milnsbridge. [X2527

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50. [5855

DOUGLAS, 2¾h.p. (1911), good going order, engine just overhauled; £14, or near offer.—Lawrence, Westwood Heath, near Coventry. [X2584

1916 Douglas Combination, 4h.p., in fine condition; owner joining forces; £60; can be seen any time.—The Crown, Cloudesley Rd., Islington, N. [3913

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

DOUGLAS, 1913, 2-speed, Bosch mag., £32/10; Model V, practically new, issued late 1917, £55; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X2609

DOUGLAS, 1915, 2¾h.p., W.D. Model, lamps, horns, speedometer, mud shields, knee-grips, condition as new, done 2,000 miles; what offers?—Box L5,741, c/o *The Motor Cycle.* [3871

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1914 2-speed Douglas, £34/10; 1915, £39/10; War Office Douglas, £39/10.—Motor Exchange, Horton St., Halifax. [3900

DOUGLAS, 1915, 3-speed, kick starter, exceptional condition, head and tail lamp sets, spare belt unused, complete set of tools, horn, etc., whole machine faultlessly kept, run very low mileage; £44.—94, Gloucester Rd., S.W.7. [3867

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Douglas, 1911, single speed, 14 gns.; Douglas, 1912, single speed, 18 gns.; Douglas, 1913, single speed countershaft, 21 gns.; Douglas, 1913 T.T., 2-speed, 28 gns.; Douglas, 1915 T.T., 2-speed, 38 gns.; Douglas, 1915, 4h.p., 3-speed, coach sidecar, 62 gns.; Douglas spares stocked. [3811

LATEST 2¾h.p. W. Douglas, brand new, with the new pattern hand-controlled clutch, the latest front forks, and many other improvements, £54, plus 20%; also U. and V. models, 1916 specification, £50, plus 10%; absolutely new; immediate delivery against priority permits for doctors, farmers, war and munitions workers.—How and where to apply, full particulars, write Douglas Specialists, Robinson's Garage, Green St., Cambridge. [3958

Enfield.

ROYAL Enfield Combinations from £45.—Wauchope's, 9, Shoe Lane, London. [3952

ENFIELD Combination, late 1916, hardly used, splendid condition; £78, bargain.—76, Broom Rd., Teddington. [3931

6h.p. 1914 Enfield Combination and accessories; £45, a bargain; no offers.—Wardle, 75, Commercial St., Rothwell, Leeds. [X2568

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

ENFIELD, 1914, 6h.p., 2-speed, coach combination, in fine order, £62/10; 1915 model, £72/10; 1916, £82/10.—Motor Exchange, Horton St., Halifax. [3901

1916 (late) Royal Enfield 6h.p. Combination, unscratched hardly used, oversize tyre on rear, hood and screen, Lucas dynamo lighting set, tools, perfect condition; worth £110, price £90.—Braid, Gwynfa, Abergele, N.W. [X2109

Special Offer to Doctors, Farmers, Hospital Nurses, and Veterinary Surgeons.

Actually in Stock. Latest Models.

New Machines.

A.J.S., 6 h.p., 3-sp., and Sidecar	**£112 0**
NORTON Big 4, all chain	**75 Gns**
ZENITH GRADUA, twin......	**70 Gns**
NEW IMPERIAL-J.A.P., lady's model, kick-starter	**£56/11/10**
NEW IMPERIAL-J.A.P., 2½ h.p. 2-speed	**39 Gns**
NEW IMPERIAL-J.A.P., kick-st.	**46 Gns**
LEVIS POPULAR, 2-stroke....	**£32 0**
LEVIS, 2½ h.p., 2-speed	**£47 10**
LEVIS, 2½ h.p., single-speed ..	**35 Gns**
ROVER, W.O. model, 5-6 h.p., and Sidecar	**£124 5**
ROVER, W.O. model, 5-6 h.p.	**£97 10**
ROVER, 3-speed, kick-starter..	**£80 0**
ROVER T.T., Philipson pulley	**£67 10**
ROVER T.T., Philipson pulley, never ridden, shop-soiled..	**57 Gns**

Second-hand Machines.

BROUGH, 2-speed, 3½ h.p.....	**45 Gns**
LEVIS POPULAR, 2-stroke, slightly used	**24 Gns**
A.J.S., 6 h.p., 3-speed, and Sidecar with windscreen......	**80 Gns**

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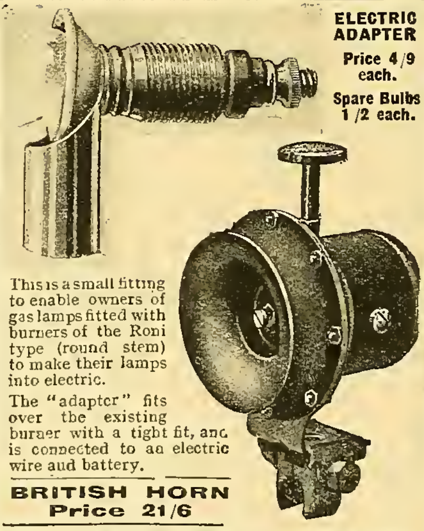
Biggest Light Car and Motor Cycle Dealers in the South.
47 years' reputation. 'Phone: 1024.
Closed Wednesdays 1 o'clock.



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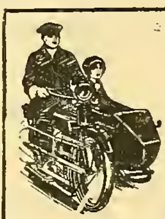
Price 4/9 each.
Spare Bulbs 1/2 each.

This is a small fitting to enable owners of gas lamps fitted with burners of the Roni type (round stem) to make their lamps into electric.

The "adapter" fits over the existing burner with a tight fit, and is connected to an electric wire and battery.

BRITISH HORN
Price 21/6

F.R.S. LAMPS, "BEAM" Works, Pershore Street, BIRMINGHAM.



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THE NORTH WALES MOTOR EXCHANGE,
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MOTOR CYCLES FOR SALE

Enfield.

1916 Enfield Combination, 6h.p., lamps, horn ometer, hood, screen, unscratched conditio —Elce and Co., 15-16, Bishopsgate Av., Camo E.C.3.

ENFIELD, late 1915, 3h.p. twin, and lightweig sidecar, £42/15; motor cycle only, £35; 19 bination, splendid order, 80 gns.; E.P. or exch. The Service Co., 292, High Holborn, W.C.1.

Excelsior.

AMERICAN Excelsior Bicycle (de luxe), 1916, perfect condition, ridden about 900 mile tric lighting, speedometer, etc., suit officer; what —Munro, Arnside, Westmorland.

F.N.

F.N. 5-6h.p. 4-cyl. Combination, C.B., 2-spee clutch; £25, bargain.—7, Linda St., Batt

Harley-Davidson.

HARLEY-DAVIDSON 7-9h.p. Combination, lights, nearly new condition; bargain.—A Settle.

HARLEY-DAVIDSON, 1917, mag. model, condition, lamps, horn; £75.—Box 1,766, *Motor Cycle.*

1917 Harley-Davidson Combination, mag. nearly new, lamps, horn; £115.—Elce a 15-16, Bishopsgate Av., Camomile St., E.C.3.

1915-16 Harley-Davidson, T.T. electric mod fect, and racing sidecar; £55, a snip.—Lo Dukes Mews, W. (up Duke St., by Selfridge's).

HARLEY 1917 Combination, practically ne plete with lamp and speedometer, horn, etc. E.P., or exchange.—Service Co., 292, High H London.

HARLEY-DAVIDSON, late 1915 T.T. mod trically equipped (lamps, horn), 3 speeds, dropped bars, very fast, in splendid condition; for 60 gns.; no dealers.—Williamson, 56, Eardle cent, London, S.W.5.

Hazlewood.

1915 2½h.p. Hazlewood, 3 speeds, clutch, foo lamps; £20, or offer.—Smith, 61, Heather Clapton, E.5.

HAZLEWOOD 5-6h.p. Combination, J.A.P. 3-speed, clutch, and K.S., lamps, speed special sidecar; £65; E.P. or exchange.—Servi 292, High Holborn, W.C.1.

Humber.

HUMBER, 3½h.p., 1912, 2-speed, new coac paraffin vaporiser, all accessories, splendid tion; £30, or offer.—63, Portobello Rd., Bayswa

Ivy.

IVY, 2¾h.p., 1915, 2-speed, 2-stroke; £20, £25.—Griffin, 89, Gt. Portland St., W.1.

James.

JAMES, all new models; extended payments change.—Service Co., 292, High Holborn, W.C.1.

JAMES, 3½h.p. twin, 3-speed, kick starter, ha trolled clutch, Lucas lighting outfit, all condition; £45, or near; exchange higher pow Ayers, Lower Stables, Kensington Palace, W.8.

J.A.P.

1914 6-8h.p. J.A.P. Combination, lamps and speed, kick starter, good condition; offers.—Parker and Son, St. Ives, Hunts.

1917 8h.p. J.A.P. Sunbeam Combination (Wa Model), No. 2 sidecar, wind screen, lugga storm apron, lamps, horn, spare wheel (unuse not done 1,000 miles; this is a lovely outfit, in e condition; £115; trial by appointment; no Walker, 54, Linaker St., Southport.

Lea-Francis.

LEA-FRANCIS 3½h.p. Twin, Mills-Fulford built sidecar, purchased February, 1915, horn, spare new chain, splendid condition; £45, change with cash for new or 1917 combination, power.—Tabora, Church Drive, Daybrook, Notts

Levis

LEVIS 2-stroke, in excellent condition all- ov trial; £16.—Box 1,763, c/o *The Motor C*

LEVIS de Luxe, 1915, countershaft 2-speed, class order and fully guaranteed, complete ment; £28.—Hynes, Lismore, Ireland.

2¼h.p. Baby Levis, perfect condition, new new belts, 1916 machine; owner called u pan seat; sacrifice £20.—Jones, Winterslow, nea bury.

Lincoln-Elk.

LINCOLN-ELK, 1914, 6h.p., countershaft ge and chain drive, underslung coach sidecar; Halifax Motor Exchange, Horton St., Halifax.

Matchless.

MATCHLESS 6h.p. 2-speed Clutch Comb B.B., variable jet, Bosch mag.; what offer Fordhouse Lane, Stirchley.

MARCH 21ST, 1918.

THE MOTOR CYCLE
ESTABLISHED IN 1903

A posse ad esse

AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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Joint Research and the Motor Cycle.

I.—How it would Help the Motor Cyclist and the Home Industry.

WHILE the motor cycle of the present day represents a great improvement as compared with machines of ten years ago, no one would suggest that we have reached finality. As a matter of fact, it is not given to human beings to attain perfection. The most that we can hope is to approximate to it. Improvements in design may result from the individual efforts of manufacturers, largely influenced by the practical experiences of motor cyclists. Improvement effected in this way is in the first instance only local. One firm makes investigations which produce important results. These are embodied into its designs. It is only when the practical value of the improvement is proved on the road that other manufacturers, under pressure of public opinion, begin to fall into line. In so doing they are handicapped by not sharing with the originator the knowledge of exactly how the improvement came about, and on what theories of experiments it was based. It is clear that, if this same improvement had been the result of joint research by the whole industry, the consequences would be more generally and immediately beneficial. All British manufacturers would be equally in a position to apply and benefit by the results obtained. If the improvement can be made the subject of a patent, this patent would not be in the hands of one firm, but in the hands of the whole British industry, which would thus be given a noteworthy advantage over its foreign competitors. Inside the British industry no one firm would benefit at the expense of another, but all would benefit at the expense of the foreigner. The reputation of the British product would thus be further strengthened and sales rendered easier throughout the world's markets.

Meanwhile the motor cyclist would be getting better value for his money. The cost of research, being extended over a large number of manufacturers, would be trifling in any individual instance. Consequently, the improvement would be effected without any expenditure which would push up the cost of the machine. If the same improvement had been the result of individual research, the cost to the individual manufacturer would have been considerable. He would thus have been obliged to charge something extra for a machine embodying the improvement. If others wished to copy it, they would have to pay him a royalty. The result would tend to be an increased price all round. Thus it is clear that it is in the interests of motor cyclists that joint research should be conducted by the industry, and it is also to the benefit of the industry itself, the point to be realised being that at the present moment manufacturers cannot afford to dissipate their energies by any unnecessary internal competition, but must concentrate on the broad problem of keeping the British product ahead of the foreign one, and giving—as a whole—better value for money than can be offered by any other nation. It is only by doing this that we can get the lion's share of the world's markets.

The motor cyclist might perhaps imagine that it is of no consequence to him whether the British manufacturer succeeds in doing this or not, but he will be quite wrong in this opinion.

Another point is that the prosperity of the whole country, including the motor cyclist himself, depends on our ability to deal satisfactorily with the problem of employment. This cannot be done unless we widen our markets and increase our productions. Thus it is clear that it would be to the ultimate benefit of the British motor cycling industry if joint research were taken up on a generous scale.

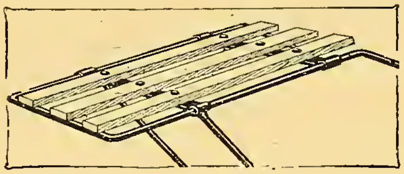
This matter of research is of vital importance, both to the motor cyclist and to the manufacturer, and we propose in the second part of this article to try and show how this valuable work can be conducted so as to make it a thoroughly sound business proposition to all concerned.

An index to the advertisements in this issue will be found on the page facing the back cover

IDEAS: Useful and Ingenious.

CARRYING SMALL PARCELS.

A DIFFICULTY is often experienced in attempting to carry small parcels on a motor cycle carrier when the space between the tubes is too large. To overcome this difficulty, attach three strips



A device enabling the carrier to be used for carrying small parcels.

of hard wood 1½in. to 2in. wide by ¼in. thick to the crossbar by means of bolts. Do not place the strips so close as to prevent two or three thicknesses of strap from passing between.—J.F.H.

SECURING INSULATING TAPE.

INSULATING tape is the chief friend of many motor cyclists, but in the majority of cases how shabby it looks, with ends hanging loose and edges all frayed, and its colour changed, by the adhesion of mud, into a dingy grey!

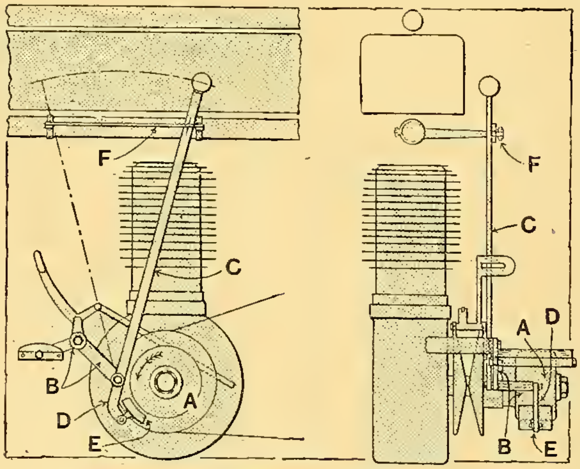
All these points can be prevented by painting it over, after the binding has been done, with a mixture of spirit black and ordinary opal or shellac varnish. This preparation, which is really a kind of French polish, dries fairly quickly with a glossy black finish, which entirely lacks the brittle nature of most ordinary enamels, and it seems to soak into and bind together all the tape wrapping. Unless the tape itself is of a superlatively sticky nature, it is advisable to fix down the last couple of inches or so with ordinary rubber solution.—J.B.S.

CONTROL LEVER FOR PHILIPSON PULLEY.

AS most readers are aware, the Philipson pulley is a patent governor pulley, which automatically varies the gear according to the stiffness of the gradient. It is also intended to be fitted with a handle-bar control (Bowden lever) for use in traffic, etc., which, by applying a slight retarding force to the motion of the brass boss (marked A in the sketch), drops the gear according to the force applied, by causing the inner and outer faces of the pulley to move further apart. On the braking force being removed, a spring contained in the boss causes the faces of the pulley to resume their original position.

On account of the war, I was unable to obtain the fitting to apply this braking force to suit my machine (a 1914 T.T. free engine Triumph), and accordingly had the arrangement shown fitted to my design. To the bracket which carries the foot brake pedal and footrest is fitted an auxiliary bracket B, bushed and fitted with a lubricator, to form a fulcrum for the hand lever C. The motion of the hand lever C is transmitted through a ⅝in. spindle to a shorter lever D about 2in. long, at the end of which is fixed a brake shoe E lined with leather. The hand lever is kept in its required position by a rack F, which is carried off the frame tube underneath the tank. A movement of about 2in. along the rack is found to give any required gear ratio when the engine is running, from 4 to 1 to the lowest available.

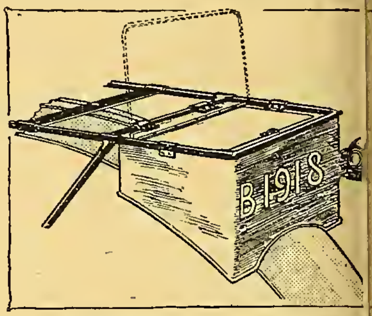
The fitting, which is a complete success, is found extremely useful for starting away from rest and for use in traffic. Before this arrangement was devised by the writer, it was necessary for the rider of the machine, when a low gear was required, to apply the necessary braking force with his left foot, which at the best of times is a crude and unmechanical method of using this most admirable pulley, for which the writer has nothing but praise, it being in every way satisfactory.—B K.



An ingenious idea for controlling a Philipson pulley.

IMPROVED TOOLBOX

THE toolbox shown, instead of l made of leather, consists of metal fitted securely to the fran the carrier, thereby making a neat strong fitment. The rear portion of

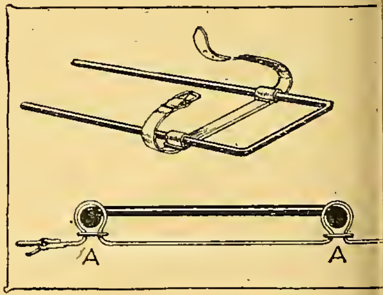


A combined toolbox and number plate.

toolbox takes the place of the u number plate, and a hinged lid is fi to the top portion. This design, whic registered, is extremely neat, and not get out of shape, as is the with the majority of leather tool ca W.H.B. (Dudley).

FIXING CARRIER STRAF

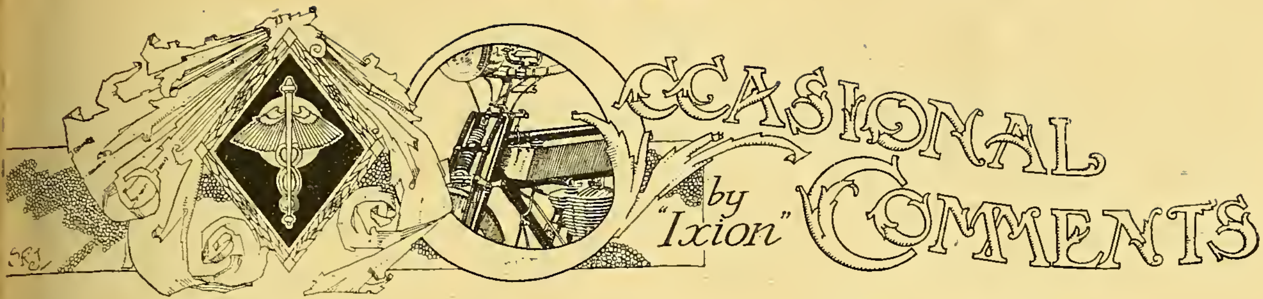
TO avoid the inconvenience of carry (and often losing) loose carrier stra the method shown in the sketch be found very effective. The points



How to secure carrier straps effectively.

are secured with wire. When not in the loose ends are lapped round the tr till just enough is left to buckle th together.—J.F.H. (Newcastle).

Readers of "The Motor Cycle" a invited to contribute to this page a ideas successfully adapted to their mot cycles. Contributions will be paid for our usual rates. Rough sketches w suffice.



Occasional Comments

by "Ixion"

British Magnetos.

MR. PENDRELL'S depreciation of the British magneto has already been pretty thoroughly dealt with. It is proved that in output and n quality of material we can equal the Bosch best, ınd, indeed, surpass it. There are other aspects of he question which are equally encouraging. Weight, or example. In road motoring, magneto weights are ıot a matter of supreme importance, but when a humping big aero engine requires four magnetos, it nakes a difference whether they weigh 20 lb. or 8 lb. ıpiece; the nett economy is equal to another machine gun, or a few extra drums of ammunition, and our nagnetos are the lightest in the world at the present noment. Again, originality counts for something. Magneto design in German hands had begun to stagnate; distributers and contact breakers, though every user could show you where they were unsatisfactory, ıad undergone no appreciable alteration for several ears. I suppose I mustn't describe some of the nstruments which I have seen lately, or I shall soon be dating my comments from Pentonville, or worse still from Dartmoor, where the Conchies are: so I nust be content with the remark that design has ceased to stagnate. Or again, the magnetos of nine-cylinder four-stroke engines run at two and a quarter imes engine speed; if the engine runs up to 2,000 .p.m. the magneto must run up to 4,500 r.p.m., and f the contact breaker is of the usual two cam type, he rocker arm must oscillate 9,000 times per minute. These are rather more strenuous demands than the average pre-war motor cycle could make; if British nagnetos satisfy them as thoroughly as they do, there s not much amiss.

Not a Monopoly Either.

IT must further be remembered that the British magneto industry is not of the hot-house order: it has not been built up under sheer compulsion behind a tariff wall. When war broke out, and caught us destitute of ignition gears, more than one Ally and neutral were able and ready to supply us with the requisite tackle. They possessed works, plant, experience, trained staffs, and supplies of such materials as they deemed suitable, and the manufacture of magnetos is one of the most delicate crafts in he world, analogous to making scientific instruments, plus the added difficulty of rather special materials. It was open to the Government to purchase its ignition abroad. British manufacturers, devoid of works, plant, staff, experience, and materials, had to build up their industry in the teeth of all these handicaps, and they secure the Government orders to-day not because their stuff is British or cheapest, but because it is the best.

A British Four-cylinder.

THE other day I encountered a British motor cycle fitted with a water-cooled four-cylinder engine. Wild horses will not drag the name of the maker from me, as it remains to be seen whether the type was evolved purely for military purposes, or whether it will blossom out into a production machine after the war. In the meantime, readers may be interested to hear a few details. The engine was a *monobloc*, mounted very far forward in the frame, and carried between duplex tubes, slung from a pair of long, straight tubes running from the steering head to the rear wheel spindle. The engine crankshaft was longitudinal with the frame, and the drive was transmitted through an epicyclic two-speed gear and bevels to a countershaft, from which an enclosed chain ran to the rear wheel sprocket. A single honeycomb radiator extended the full width of the machine just in front of the steering head. Engine lubrication was performed by the well-known trough system, and the sump carried sufficient oil for 1,000 miles. The petrol tank contained three gallons, and was by no means ungraceful in outline, being tapered towards the front, and fitting down snugly on top of the fore and aft diagonal frame members. A kick-starter was fitted. The engine was suspended at three points, and could easily be dropped clear for decarbonisation purposes, after the exhaust and inlet piping and the wiring had been cast loose. Gas was furnished by an automatic single lever carburetter. The weight of the outfit may be estimated at between five and six hundredweight, and the probable retail post-war cost at no less than £150.

What will it be up Against?

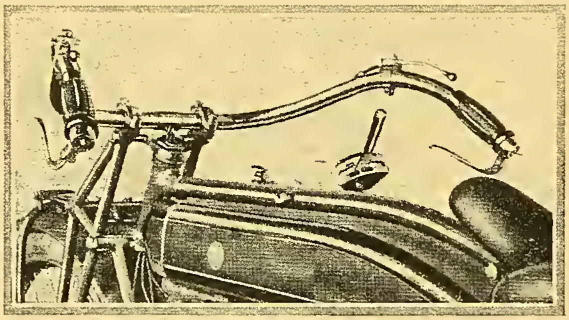
THIS machine may stand as an attempt to graft as many as possible of the advantages of a light car on to a three-wheeler. Such a mount should be practically the equivalent of a light car, except that it will take more handling round corners, suffers more from vibration, affords less protection to its driver, depreciates in value more rapidly, and carries less luggage. These are all serious defects in a comparison, but will be accepted by purchasers, as past trading history proves, *provided the outfit costs appreciably less* than four-wheelers which are free from these glaring faults. It is improbable that any light car will be produced within £50 of the sum for which such an ungainly three-wheeler can be manufactured. In other words, the costly and thumping sidecar outfit exists by favour of the cycle car. If anybody produces a decent cycle car, such as already exists on paper, the 10 h.p. water-cooled sidecar 'bus must scurry off the market double quick, otherwise it will probably survive.

RIDING POSITION.

A Plea for Adjustable Footrests and Handle-bars.

MOST riders of modest stature appreciate fully the convenience of adjustable footrests and handle-bars. Recently I lost a purchaser simply owing to the fact that my machine would not fit him. In every other respect he was delighted with it, but being short in the limb he was compelled to sit spreadeagle, as it were, arms and legs fully extended—a truly ludicrous spectacle that conveyed the impression that the machine was running away with him. For a small man to be compelled to ride in such a position must, indeed, be a sore trial in life, as no amount of saddle adjustment will permit the correct proportion of distances.

Quite apart from the question of stature, however, each rider has his individual tastes as regards riding position, and a considerable diversity of opinion exists as to what *is* the best position. The position that one man finds most restful may prove tiring to another, and again, some prefer one position for sidecar driving and another for solo use. The semi-T.T. position, which may be regarded as the best so far as controlling a solo mount is concerned, is generally unpleasant for sidecar use, so that the need for simple adjustment, giving a reasonably wide range of choice, is obvious.

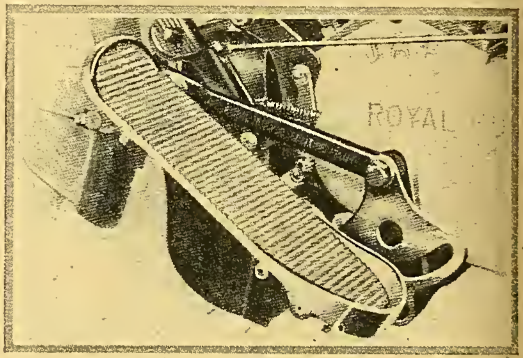


Adjustable handle-bars fitted to the A.B.C.

Riding Position.

Personally, I consider the position afforded by the Scott as ideal for sidecar use, but for solo use it falls short of perfect safety on a fast mount. Most Scott riders know this to their cost, having experienced that fatal front wheel skid when cornering at speed. The design of the Scott is such that one is tempted to take corners on the fast side, and with the touring bars it is merely a matter of time ere one comes to grief. Fit T.T. bars and the danger is removed, owing to the better control and the better judgment afforded by a proper feel of the machine.

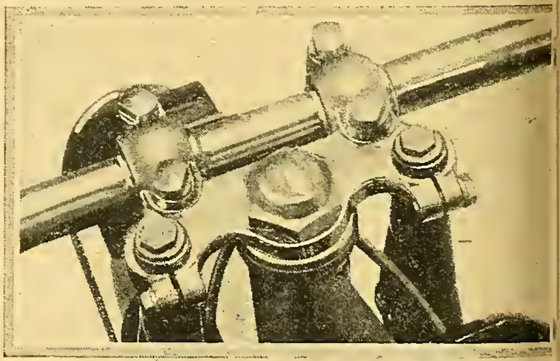
Personally, I consider that the best position for solo riding is one which permits the rider to sit upright with arms straight and fully extended when hold
the handle-bar grips in a natural position. W
riding naturally, one is then stooping very slightly f
ward, which counteracts the forward pull of



The Royal Ruby adjustable footboards.

machine, while the arms being straight less fatigue
felt than if the strain were taken through bent joir

As regards the matter of fatigue, even more depe
on the position of the footrests than on the position
the bars. Many riders make the mistake—and t
undoubtedly *is* a mistake—of riding with their fo
boards so far forward that they are unable to sust
any of their weight on their legs. The result is t
all their weight is on the saddle, and on a long ri
considerable fatigue is imposed upon the spi
Furthermore, with the footboards too far forward, ro
shocks are more keenly felt, broken saddle springs
experienced, and on rough going the rider is so mu
bounced about that his control of the machine is v
imperfect. A small man on a machine too large
him invariably experiences the discomfort of fo
boards too far forward.



The means of varying the handle-bar position on the Indian.

Riding Position.—

But, whatever be the worst or the best position, a wide margin remains for one's physical dimensions and personal choice. It is very seldom that a new machine passes into one's hands which exactly meets one's requirements as regards position—especially in the heavy sidecar class of mount. A slight adjustment of the bars and footrests, if such a thing were possible, would add enormously to one's comfort, and more than once I have effected an improvement by reversing the footboards or bending the handle-bars out of all resemblance to their former shape.

It would be a good plan to take a hint from the Americans as regards adjustable bars. The majority of their systems are entirely satisfactory in practice, and most riders would highly appreciate the possession of a bar which could be made semi-T.T. or touring at choice, and by means of a simple adjustment.

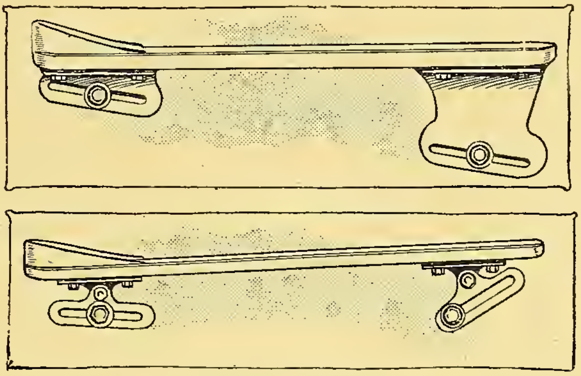
Adjusting the Footboards.

Adjustable footboards present greater difficulty, but only one movement is really necessary—that is, it should be possible to slide the boards backwards and forwards while they retain the same angle for one's feet. As a matter of fact, the boards should be almost parallel with the road; if anything, tilted very slightly upwards at the toe. In these days of low-built frames there is no question as to the man of short limb being able comfortably to reach the boards, and all that he requires is to be able to slide them backwards towards the saddle, so that he can sit without unnaturally extending his legs.

The design suggested herewith permits this movement, and, it being taken that only a man who is short in the limb will require the rests in the backwards position, the slots in the brackets mounting the rests could be set to determine the height also—the footboards rising when drawn back for a short rider, and falling when thrust forward. The second suggestion permits both movements, and also permits adjustment of the angle, which may occasionally be desirable to a small extent.

One feels convinced that if manufacturers would adopt such systems, free from gadgets and adding no unnecessary weight, they would be fully utilised.

CHINOOK.



Adjustable footboards suggested by "Chinook."

* * *

A CORRESPONDENCE.

A Queer Query anent the Reality or Fiction of the Personality of that Mysterious Walking (?) Encyclopædia "Ixion."

From A. R. Eader, Castroil Lodge, Revden, Hants.

DEAR IXION,—In June, 1914, I made a bet with a pal that "Ixion" does exist, and that he is not a masculine Mrs. 'Arris.

My friend alleged that whenever any member of *The Motor Cycle* staff had a few minutes to spare, or brain wave (don't blush), he dashed off something which appeared under the general heading of "Comments."

I, on the other hand, affirmed the existence of a genuine "Ixion," and further deduced from his articles that he was now of middle age, came from Tipperary (or at any rate was of Irish extraction), and that after a somewhat lurid youth was now respectably staid, and married. He has a family, including a son, who, when father is safely at the office, bags the latter's pet 5 h.p. single gear solo twin. "Ixion" objects to 3½ h.p. sidecar outfits, as Mrs. Ix is in the heavyweight class.

Well, the loser was to clean the winner's machine, and we were both allowing our mounts to get into a suitable condition when Potsdam Bill thought it was time to begin enlarging his dominions.

My friend, alas, will ride no more—unless Elysium has its roads—or I should have written before, and claimed the bet. Still, it has been intriguing me for some time, and an assurance that "Ixion" is a real person would greatly oblige.

I think, too, you are still a little fond of strong waters, after which you sometimes have deplorable lapses.

Yours truly,
A. R. EADER.

From "Ixion."

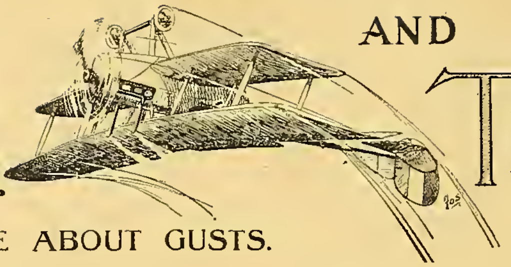
Dear Sir,—I have tried to duplicate your effort in literary analysis, but I fear with no very great success, partly ascribable to the fact that no heavy stakes spur my effort. At first I decided from evidences of intense curiosity in your letter that you were a female D.R. But anon, from your free treatment of the text under discussion I judged you to be a Broad Church parson, masquerading under a pseudonym. Finally, I decided to respect your evident desire for privacy, and to avoid prying into your hideous past and doubtless equally repulsive present.

As a matter of fact, you were a good deal nearer the mark than your friend—peace to his ashes: but here and there you allow yourself to make a false deduction. For example, my detestation of sidecars applies equally to the 7-9 h.p. variety.

In return for these sacred confidences I implore you to tell me where one may now procure those strong waters you speak of: I have been unable so much as to smell them these many moons past.

Yours faithfully,
"IXION."

FLYING FACTS AND THEORIE



MORE ABOUT GUSTS.

By W. G. ASTON, A.M.I.A.E.

IN my last article I described the effects of gusts having a resultant motion in the vertical plane of the fore and aft axis of the aeroplane. It will be seen that there are two other principal planes in which gusts can move, namely, the horizontal plane of the fore and aft axis, and the vertical plane of the transverse axis. Any imaginable gust must be either in one of these planes, or in some combination of them, and hence its total effect can readily be realised by considering to what each of its components gives rise. Dealing first with horizontal gusts, let us employ the compass points to denote the direction of the gust, the aeroplane being supposed to be flying in a straight line due north. Any gust which comes in this particular direction falls into the category that has already been considered, and so we need now only consider gusts which are at an angle to the line of flight. Looked at from above, an aeroplane is perfectly symmetrical about its fore and aft axis; hence only one half of the compass card need be discussed, as whatever happens on one side will have its counterpart on the other in the nett effect upon the machine, though the *direction* in which the subsequent disturbances take place will be reversed, of course.

Rolling.

Let us take a gust coming towards the aeroplane from the direction N.W. This produces two very important effects. First it alters the direction in which the air moves across the section of the main planes, and, second, it promotes a relatively sideways motion of the aeroplane, and in so doing generates upon the side surfaces a pressure, just as, in the ordinary way, the relative wind generates a pressure on the horizontal surfaces.

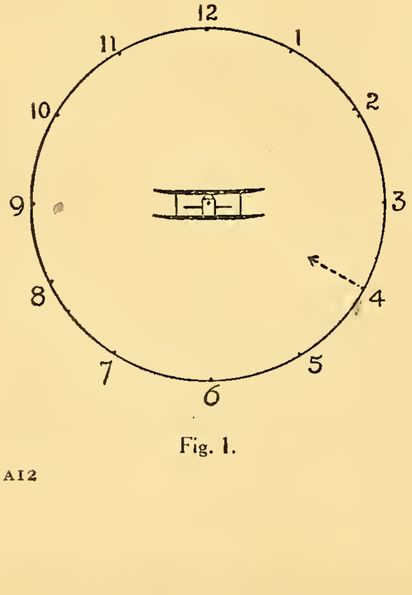


Fig. 1.

In regard to the first point, it will be seen that the main plane is no longer travelling broad edge first, but is moving diagonally. Since the centre of pressure always tends to be rather towards the leading edge than the trailing edge of a plane, this means that the C.P. moves from its previous central position, shown by a circle in fig. 1, and takes up a fresh position, as indicated by the +. As this C.P. is point of application of the upward lift force, anc no longer coincident with that of the downward fo due to the weight of the aeroplane, a couple is forn which tends to lift the western wing of the mach and to depress the eastern wing. In short, the mach "rolls" over to the position shown in fig. 2. T can be corrected immediately by the pilot, who, the flap, wing-warp gear, has means at h for promp making the ı chine roll the oppo direction, a so can, in moment, reinstate it upon an even keel.

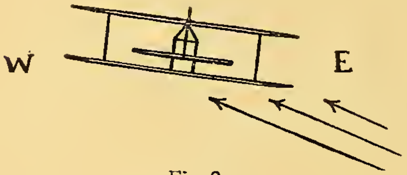


Fig. 2.

If the machine is not so controlled, it will if later stable (as most modern types are) correct itself side-slipping towards E. Such a side-slip will o more promote a diagonal movement of the air acr the main plane, but this time in the opposite directi That is to say, by side-slipping towards E the east wing tends to rise and the western to be depress hence if left to itself a stable machine will regain even keel on its own account, after being struck b gust, but to do it will roll first one way and then other. By exercising his control the pilot can av any discomfort arising from such movements.

The automatic recovery by rolling is enhanced a accelerated by the commonly employed dihedral ang

Weathercock Stability.

Next as to the effect of the fin, which is a fi directional surface mounted on the tail. When relatively sideways wind strikes the aeroplane position of the C.P. so caused will depend upon shape and size of the body, the amount of dihed angle, etc.. but, above all (since it is at the end of a long lever), upon the size of the fin. If this is big the lateral force will tend to be behind the C.G. of the machine, as shown in fig. 3, and so will tend to turn its nose towards

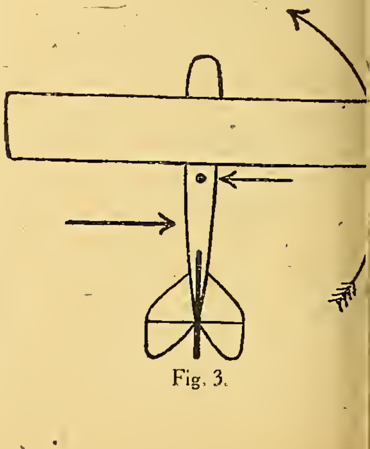


Fig. 3.

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P706

BRANCH OF THE IMPERIAL TOBACCO CO (OF GREAT BRITAIN & IRELAND) LTD

Flying Facts and Theories.—
the direction from which the gust is coming. This action is called "weathercock stability." On the other hand, if the fin is very small the reverse will take place, and the machine will tend to turn away from the gust. Whichever effect takes place the pilot can overcome it by means of the rudder, and the direction in which he will apply this organ will depend upon whether the machine is under-finned or over-finned. Most machines tend to follow the weathercock principle, but not all. It will easily be seen that there may be some particular surface of fin which would promote a turn neither in one direction nor the other, so that directionally the aeroplane need not be disturbed, though the sideways gust would still provoke a "roll." The correct dimensioning of the surfaces for this purpose is one of the most important factors in the design of an inherently stable aeroplane.

Pitching.

We must also not fail to take into consideration the fact that the gust, coming from the N.W., or diagonally, has a tendency to cause the machine to pitch. What we have already dealt with is principally its transverse component, and such pitching is caused by its longitudinal component. As pointed out in a previous article (see the issue of *The Motor Cycle* for February 28th), the effect of this head-on component will be such as first to tip the nose of the machine up and make it at once slow down and climb, afterwards, when the gust has passed, inducing it to tip its nose down and lose altitude.

The north-westerly gust, in the conditions outlined, thus exercises three distinct influences, all of which take effect at the same time. First, it tends to cause the machine to roll; secondly, it tends to cause the machine to pitch; and thirdly, according to the fin area, it tends to cause the machine to alter its direction. These three effects compose a form of disturbance which can, however, quickly be met by the controls at the command of the pilot.

Gusts in the Vertical Plane.

Turning now to gusts in the vertical plane, but this time transverse to the aeroplane, these can be denoted by a clock face in which the machine is supposed to have its fore and aft axis coincident with that of the hands of the clock, as indicated in fig. 4. Here, again, owing to the fact that the aeroplane is symmetrical in this plane, the effects of gusts from 12 o'clock to 6 o'clock (through 3 o'clock) will be exactly similar, in all but direction, to those which come from 12 o'clock to 6 o'clock (through 9 o'clock). As we have already dealt with such gusts as came from due 12 o'clock and from due 3 o'clock, it is now only necessary to consider diagonal ones coming, say, from 4 o'clock.

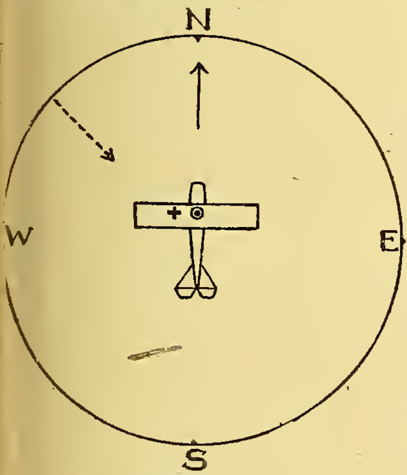

Fig. 4.

One from between 12 and 3 will yield similar results but in a different direction.

Composite Gusts.

When the gust is partially upwards and partially sideways, as shown in fig. 5, the fact that the plane now has a lateral angle of incidence and is travelling diagonally, instead of straight forward, promotes a movement of the centre of pressure towards that end which is entering the relative wind. Consequently a couple is formed which causes the machine to roll, so that its left wing is depressed and its right wing raised. This, again, is followed by a side-slip towards the left, which, especially with a dihedral angle, provides a restoring action.

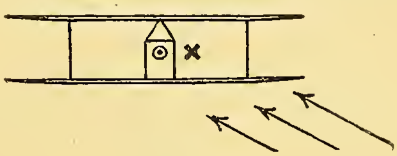
Fig. 5.

As the same time the gust has an effect upon the direction of the machine, causing it to turn its nose into the gust, if the tail fin be big, and *vice versâ*. It will thus be seen that, except for the pitching influence which the former exerts, a diagonal gust in the horizontal plane is exactly similar in result to one in the vertical plane.

Summary.

This can be summarised into the statement that, in general, gusts which are in the vertical plane of the longitudinal axis of the aeroplane will cause it only to pitch (leaving motions of translation out of the consideration for the time being), whereas any other gusts will cause it both to roll and to lose direction. Rolling being thus far more likely to occur than pitching, it follows that most of the work done by the pilot, in straight cross-country flying, is on the wing flaps, or ailerons.

When observing a machine either automatically correcting a roll or being restored to an even keel by the pilot, one can hardly fail to notice how quickly this evolution is carried out. It is, in fact, generally little more than a sort of "flick," whereas the correction of a pitch is a matter of more time. This is because the weights of the machine—pilot, passenger, engine, tanks, etc.—are so disposed in it that the moments of inertia about the fore and aft axis are very small—in other words, in the transverse section, all the principal weight is centrally situated. In consequence a roll can be very quickly checked, and especially so, since in this connection the amount of control available is very large, one flap lifting one side of the plane up whilst the other pushes its side of the plane down.

A machine of moderate size will roll through a complete circle in about five seconds, hence the correction of a roll of 10°, which amount will be very perceptible indeed, will only take about one-seventh of a second to perform.

MILITARY NOTES.

The A.S.C. in the Thick of it again. The Short Leave Petrol Licence.

CROIX DE GUERRE AWARD.

WE are exceedingly pleased to learn that Temp.-Lt. D. S. Baddeley, A.S.C., formerly treasurer of the Motor Cycling Club and a well-known competition rider, has been awarded the Croix de Guerre by the King of the Belgians.

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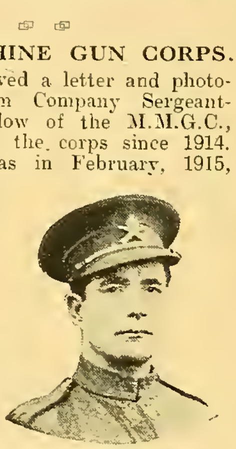
MOTOR MACHINE GUN CORPS.

WE have received a letter and photographs from Company Sergeant-Major Harlow of the M.M.G.C., who has been in the corps since 1914. He went Overseas in February, 1915, was wounded in the second battle of Ypres, and he is now working at the depot. Sergeant-Major Harlow points out that the men in the group (reproduced on this page) have all returned from service Overseas, some from the L.A.M.B. and some from the M.G.C. Their average service Overseas is eighteen months.



Company Sgt.-Maj. F. J. Harlow, one of the few N.C.O.'s left who helped to form the Motor Machine Gun Service in Nov., 1914.

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A COVENTRY M.C. MEMBER PROMOTED.

CONGRATULATIONS to Sec.-Lt. Fred. J. Spencer, A.S.C., M.T., who got his commission recently after two years' service in the ranks in France. F.J.S. was a prominent member of the Coventry and Warwickshire M.C. in pre-war times and an indefatigable worker on the committee.

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THE M.T., A.S.C.

ALTHOUGH we have devoted a great deal of space to the evergreen subject of "Cushy Jobs" and "Danger of the M.T., A.S.C.," and have intimated that the topic has been fully treated, letters on the subject still pour in for our Military page. Among a batch recently to hand is one from Cpl. J. Rice, A.S.C., who says:

"May I defend the A.S.C. against that grossly unfair and wholly unfounded inference by 'Tank Driver' that this unit is never subjected to so great danger and hardship as is the combatant unit? Your correspondent asserts that an A.S.C. man has never driven a Tank into action, and I wish to reply that I am at present in daily contact with a man—not even transferred to the M.G.C. or Tank Corps—who is awaiting his discharge from the Army on account of the severe disabilities sustained while doing duty with a Tank in France. We have many other instances of a similar nature passing through daily, and even have men here who have been 'Tank instructors,' primarily recruited from the M T."

OFFICERS' DRESS.

OWING to the shortage of leather, officers are to be allowed to wear brown shoes when engaged in offices and when off duty. Khaki coloured socks must be worn on these occasions.

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DESPATCH RIDER FOR TWO AND A HALF YEARS.

WE had an interesting chat with Cpl. A. C. Webb last week, who is home on leave from Palestine, after two and a half years' service. On December 6th last we illustrated several of his photographs and gave a description of a D.R.'s life in Palestine. Among many things he said was that no one realises what the advance to Jerusalem was like, and the true story has yet to be written. Incidentally he mentioned that an important event in his life is taking place during his three weeks' leave, but the date of the marriage we did not learn. We wish him every happiness, and may good fortune be with him on his return to the Holy Land.

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PUTTING THE "TIN HAT" ON.

"BLIGHTY" writes: "I have been greatly amused at the letters on the topic 'Danger in the M.T.'

"'Tank Driver' seems to put the 'tin hat' on the whole thing by saying that he has never seen an M.T. man in any other capacity or place that our fighting troops would not call 'cushy.'

"I think that it would be a good thing if 'Tank Driver' would compare the casualty lists of the M.T. with that of the Tank Corps. He would be a bit surprised. I should advise him to keep his eyes open for a short time each day, and he might be able to see a few thousand M.T. men who have not got a job which our fighting troops would call 'cushy.'"

SPECIAL PETROL PERMIT

PTE. W. H. MILLARD, M.T., A. writing from a rest camp, s "I have been despatch riding I first landed in France on April 1917. I was then attached to a H Artillery Group. As no doubt you k my duty was to take messages up to guns—not a cushy job, dodging F old iron when he was trying to k our batteries out and shelling the t port. It was bad enough in dayl but rotten at nights—'no lights allo shell-holed roads to traverse, and t timber and boxes to run into that been dropped off our transport wag

On Leave.

"I am an old member of the Wool Plumstead and District M.C.C., a have just had a taste of the old jo sidecarring in Old England, thank *The Motor Cycle*. I arrived hom February 18th for fourteen days' l and was not in the house long bef had *The Motor Cycle* in my hand, saw that a soldier on short leave obtain a special petrol permit from Berkeley Street. I sent for the ap tion form, filled it in, and called my permit, and got one right away trouble at all. My brother kindly me his 1917 6 h.p. Enfield and sid and I was able to take my wife daughter (age twelve years) and son three years) to Norfolk, etc., visitin wife's sisters and their pantry, having a real good time. Altogeth covered over 350 miles.

"Now I have left all that ple behind, and am longing for more. now in a rest camp waiting to cros pond to join my column and to hea shout, 'D.R. wanted, urgent mess But the message I am most anxi waiting for is the one, 'Cease tilities!'"

Boys of the M.M.G.'s returned from Overseas. They average eighteen months' Overseas serv

A NEW NON-LEAKING CARBURETTER.

A Design that was the Outcome of Experience with the Present Day Carburetter.

THE article by "Chinook," which appeared early in November, 1917, on "Which Type of Carburetter?" was a timely reminder that perfection has not yet been attained in this important adjunct to the motor cycle—indeed, more recent articles touching on other parts make one wonder if any single component part has, so far, reached that ultimate goal.

"Chinook's" indictment of present-day carburetters set me thinking about the carburetter troubles I have experienced on my 6 h.p. Clyno combination during 1917, and of the remedies devised, which ultimately led to the design of a new type, not perhaps inappropriately called a "non-leaking" carburetter.

But before enlarging on the defects of the old apparatus and the remedies devised to eliminate them, a word as to its design. It is a well-known, and in many respects a deservedly popular, type, with two-lever control, having a central gas regulating valve with a circular air valve surrounded by the latter. The fuel enters the spraying chamber through a number of holes placed across the path of the incoming air, and a good mixture is obtained for either slow or fast running. The slightest touch of the gas lever is reflected in the speed, and acceleration is as rapid as any ordinary rider could desire. Once fairly on the road with tight needle valve and a jet of suitable size for the kind of fuel being used, I have nothing but praise for this carburetter.

My first and constant trouble has been difficulty in starting. Notwithstanding perfect compression and certain ignition, I have never had entire confidence—born of successful experience—that I should get the engine started at the first attempt, and my repeated failures made me suspect one thing after another: leaky joints, badly fitting air valve, insufficient petrol or over-flooding. These were all in turn suspected, but no alteration produced any marked improvement.

Stopping Troubles.

The second trouble was of quite a different nature. Instead of a *starting* it was a *stopping* trouble I was up against. The importance of cooling the cylinders and pistons of air-cooled engines cannot be too strongly emphasised, so, with all sensible riders, I endeavour at every opportunity to cool my engine, and on every descent worthy of the name attempt to shut off the gas and give the engine full air. But, alas! the gas valve is not a real *shut-off* valve, and I have found it impossible to prevent the engine's firing without either cutting out the ignition or (undignified necessity) shutting the petrol cock on the tank, say, a hundred yards before reaching the descent and then having to open it again towards the bottom. Now I object to such a crude method of cooling an engine, but I more strongly object to the useless waste of precious fuel, which ought to be avoided by merely closing the gas valve.

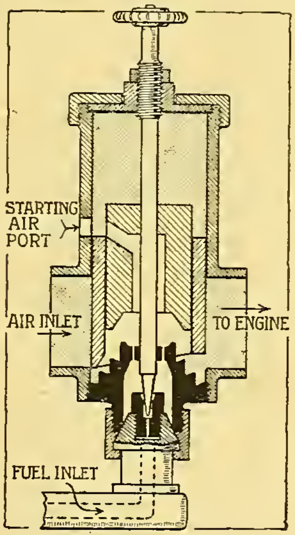
My third and last trouble I put down to the heavy war spirit now on the market, and to the attempt to economise by mixing paraffin with the spirit.

One other point, not so much a difficulty (as the cause was evident) but a serious source of waste, was occasioned by a leaky needle valve in the float chamber. Why should the overflow due to this be allowed to escape through the bottom of the carburetter and be lost?

Principles of the Carburetter.

Whilst it might interest the readers of this journal to follow the steps by which, one after the other, these defects were overcome, considerations of space forbid their recital. Suffice it to say that this was actually accomplished in the carburetter now fitted to my engine, which has the following features:

(1.) No holes at the bottom through which fuel can leak out. A rich starting mixture is obtained by admitting air from the *top*, through the centre of the gas valve, causing the air to impinge directly upon a shallow well of fuel, thus violently agitating it, and giving such a mixture that fires at the first attempt. Even if overflooded for starting up no fuel is lost, as it is retained in circular receptacles provided for that purpose, and is gradually used up as the engine runs.



The non-leaking carburetter designed by F. S. Inglis.

The Working.

(2.) A gas regulating valve which actually shuts off the fuel when in its closed position, the valve being centrally guided, and having a mitre face resting on a corresponding seat. The inlet from the float chamber is placed within the circle enclosed by the gas valve, and when coasting pure air alone can be admitted for cooling the cylinders, etc. Thus, a feature of the greatest importance is secured, which will go a long way to prevent overheating, with its loss of power, and also result in a considerable saving of fuel.

(3.) An adjustable jet, controlled by a needle valve operated from the top of the carburetter (thereby eliminating another source of leakage, as compared with that having adjustable jets at the bottom). A turn with finger and thumb gives a larger opening for heavier fuels, or for stiff climbing, etc., and a reverse turn brings it back to its original setting; thus a temporary increase in fuel is obtained whenever necessary without changing the jet.

(4.) Any leakage taking place through the needle valve in the float chamber is not lost, but must be used in driving the engine, as there are no openings in the bottom to allow it to escape.

A glance now at the sectional elevation of this carburetter will show that these advantages have been obtained in a simple, direct manner, and, as the moving parts are concentric one with the other, smooth and accurate working is assured. The Bowden wires have been omitted from the drawing, but these pass through the top, one on either side of the needle valve spindle, and are operated as usual from the handle-bar. Another minor feature worthy of notice is that the air port through the gas valve may be closed in every position of the air valve, so that whilst standing with a hot engine and the gas valve closed no petrol can be vaporised and pass out of the top air holes. The needle valve spindle, it will also be observed, acts as a central guide for the gas valve, and ensures accurate fitting on to its seat.

Results of Tests.

In order to test this new design, special permission was obtained from the authorities, and during December a few runs have been made. Before this I had the cylinders of the engine down and fitted new rings; consequently the compression was very poor, not supporting my weight on the starting lever as it did previously. In spite of this and the cold, frosty weather, the engine started regularly at first attempt. With the first experimental setting a speed of 34 m.p.h. was obtained with a total load of twenty-six stone, and the fuel consumption at the same time worked out at 54 m.p.g. The mixture proved, however, to be too rich, and difficulty was found in keeping the speed down to 10 m.p.h. on top gear. By lowering the petrol level, I have no doubt considerable improvements all round will be secured. No hill-climbing has yet been attempted, but when various adjustments of the carburetter have been tried and the best setting determined—which will at the same time run in the new rings and restore the compression—exhaustive tests, of course, will be made.

Two motorists have formed such a favourable opinion of the new design that they have invited the writer to design one on similar lines for car use, which they will fit to their cars. This is now on the way, with the addition of a pilot jet.

In the meantime, a patent has been applied for, and provisional acceptance has been secured.—F. S. INGLIS.

Times to Light Lamps.

GREENWICH TIME.		
Mar.	21st	6.42 p.m.
,,	23rd	6.46 ,,
SUMMER TIME.		
,,	25th	7.49 ,,
,,	27th	7.52 ,,

The Patent Office.

The Patent Office has long been a convenient butt for any abuse that might have been in need of a home, but we wonder how many readers are aware that this long-suffering institution dates from so distant a date as 1627?

A Note on Committees.

While we take no responsibility for the truth of the statement, we have heard it said by a "competent authority" that the complete list of committees now in existence under Government patronage occupies a thick closely-printed quarto volume.

The Industrial Reconstruction Council.

This organisation is working hard on its programme for attaining the millennium when the war is over. All interested may obtain full particulars as to how this desirable end may be simply attained on application to the Secretary, 8, Bouverie Street, E.C.4.

The Death of Mr. John Marston.

We recently announced the death of Mr. Roland Marston, of Sunbeam fame, and now very much regret to have to announce the death of his father also. Mr. John Marston died on Friday, the 8th inst., in his eighty-second year. He was practically the founder of the Sunbeam Motor Co., Ltd., and was also one of the first to recognise the possibilities of the motor car as a commercial proposition.

The Elusive Fuel.

The following figures, taken from the *Board of Trade Journal* for March 14th, show the number of petrol licences issued under each of the four separate issues of petrol licences made from Berkeley Street :

	LICENCES ISSUED.			
	First Issue.	Second Issue.	Third Issue.	Fourth Issue to 28th Feb., 1918.
Private cars .	94,111	84,610	70,452	54,719
Private cycles	95,098	48,580	34,462	27,303
Doctors' cars	14,636	11,966	10,250	9,050
Hackney vehicles	22,189	19,061	16,351	14,655
Commercial vehicles	35,677	32,290	38,880	31,706
Industrial processes	44,303	41,375	60,061	51,256
Total ..	306,014	237,882	230,456	188,689

German Propaganda.

Readers who have been interested in the correspondence we have recently closured on "Goods Made in Germany" are recommended to read two books, "Peaceful Penetration" (Constable, 3s. 6d.) and "The Bloodless War" (Hodder and Stoughton, 3s. 6d.) These deal with German trade methods, and the second shows how Germany obtained control of and practically ruined Italian trade enterprise.

Riding Position and Tall Riders.

Apropos of the article on page 272 of this issue, we had, recently, a chat with the works manager of a well-known firm on this matter. He acknowledged that their own machines were sinners in respect of discomfort to the tall rider, although we know of many worse. He assured us that their designers had expended considerable time on this point, with, only an unsatisfactory compromise as a result. He claimed that it should be possible to construct a system of adjustable footboards, handle-bars and saddle, so as to suit any rider to perfection, and he hoped before long that his firm would be able to make a distinct advance in the right direction. Without doubt this subject requires very serious attention by all designers, to prevent that weariness at the end of a long ride so well known to long-legged riders.

Special Features.

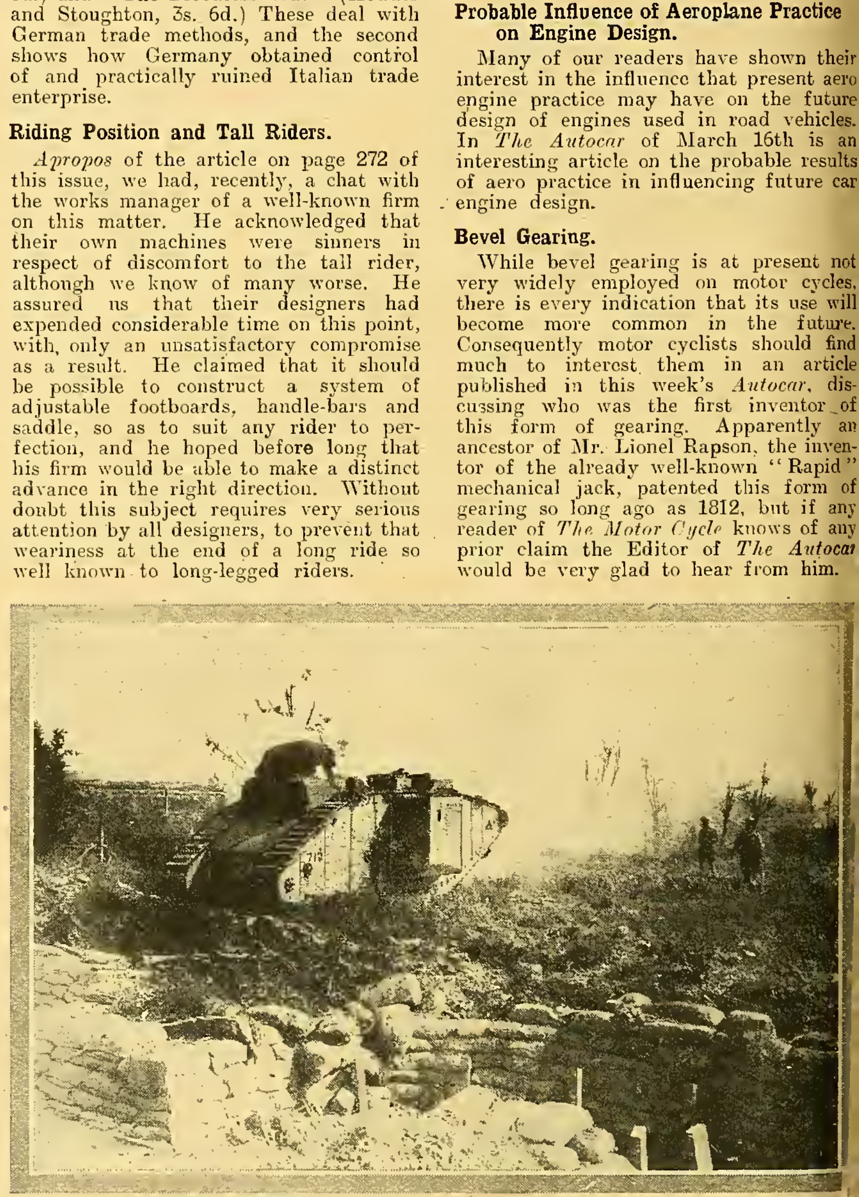
A NON-LEAKING CARBURETTER.
RIDING POSITION.
10,000 MILES WITH A DYNAMO LIGHTING SET.

Probable Influence of Aeroplane Practice on Engine Design.

Many of our readers have shown their interest in the influence that present aero engine practice may have on the future design of engines used in road vehicles. In *The Autocar* of March 16th is an interesting article on the probable results of aero practice in influencing future car engine design.

Bevel Gearing.

While bevel gearing is at present not very widely employed on motor cycles, there is every indication that its use will become more common in the future. Consequently motor cyclists should find much to interest them in an article published in this week's *Autocar*, discussing who was the first inventor of this form of gearing. Apparently an ancestor of Mr. Lionel Rapson, the inventor of the already well-known "Rapid" mechanical jack, patented this form of gearing so long ago as 1812, but if any reader of *The Motor Cycle* knows of any prior claim the Editor of *The Autocar* would be very glad to hear from him.



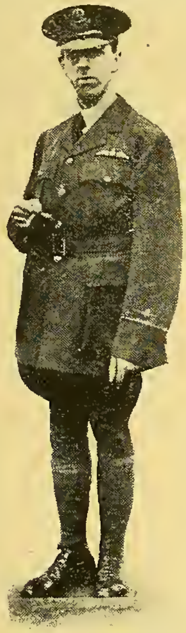
A striking photograph of a Tank going into action near Messines. (*Official.*)

ational War Funds.

he National Relief Fund ..	£6,334,814	0	0
ritish Red Cross	£9,503,101	13	8
obacco Fund	£150,006	0	0

he Royal Air Force Uniform.

The new R.A.F. uniform should be istinctly attractive. The tunic is the rdinary service pattern; the rank is hown by means of ark brown rings n the cuffs, and re the same as hose in the Royal Navy—that is to ay, one ring for a ub or second-ieutenant, two for lieutenant, and so n. On each sleeve here is an albatross n gold, which was ormerly the badge f the Naval Flyng Service, and a rown. Officers are o wear a khaki ollar with the acket, and a black ie and gilt buttons. The black tie, of ourse, is another elic of a naval ustom. Slacks will lways be worn, exept in the case of ilots. The cap is omewhat like a aval cap in appearnce, has a stiff lack peak, a deep lack braid band ound the edge, a haki top, and over he peak the R.A.F. badge, consisting of ak leaves, an albatross, and the crown. After the war the uniform will be blue n colour, or rather the tint is more of a ark slate grey than blue. It is now orn as a mess jacket, in which case he ranks are shown by gold rings on he cuffs, as in the Navy.


The new uniform of an officer of the Royal Air Force.

mports and Exports.

The Board of Trade returns for Febuary show that only one motor cycle was imported, valued at £10. Accessories, tyres, etc., to the amount of £2,525 were received into the country.

Exports.

Compared with February, 1917, exports show a decline of £30,000. The value, including tyres, parts, etc., was £32,155.

	1916	1917	1918
Number of machines ..	1,133	882	508
Value of motor cycles, parts, etc.	£80,573	£66,142	£32,155

Another of Them.

The latest addition to the list of committees working under Government patronage is one to consider the "Resettlement of labour after the war." The duty of this particular committee, which has the honour of being appointed by the Ministry of Labour, is to advise the Government on matters connected with the resettlement of labour after the war consequent upon the demobilisation of the Forces, etc.

Its immediate interest to motorists is that Sir Herbert Austin, K.B.E., has been appointed to represent the Federation of British Industries on it.

A Raid Mystery.

A resident at Richmond complains that whenever a raid is taking place or a warning has been given, a large and brilliantly lighted car goes right through Richmond and along the Sheen and Upper Richmond roads, and is followed by a motor cycle and sidecar with exceedingly powerful lamps.

A Pointed Comment.

According to *John Bull*, some of the Petrol Controller's staff are conscientious objectors, employed at a salary of £300 a year. We should imagine that the comment of the average soldier who has been refused a licence by one of these gentry would be represented in print most expressively by —— * * *.

The Motor Users' Protection Association.

A meeting was held at the Cannon Street Hotel on Thursday last, the object of which was to found a new motoring organisation, which will be known as the Motor Users' Protection Association, the object of which may be said to advance generally the interests of motor vehicle users. The meeting was due to the initiative of Mr. H. E. Sanderson, 42, Howard Road, South Norwood, London, S.E.25.

The duties of the new association are apparently those which have already been the duties of existing motoring bodies, namely, to combat anti-motoring prejudice where it exists, to resist excessive taxation, to fight fuel rings or other trusts opposed to motoring interests, to prevent the imposition of unreasonable restrictions, and to see that the proceeds from motor taxation are spent on the improvement of the roads.

About forty people were present, and, provisionally, it was arranged to draft rules, to decide the amount of the annual subscription, and to determine generally the future position of the body.

Safety First.

On the occasion of an inquest held the other day on a widow who was knocked down by a D.R. in the Old Kent Road, Mr. Oddie, the Lambeth coroner, remarked: "The golden rule is to stand still."

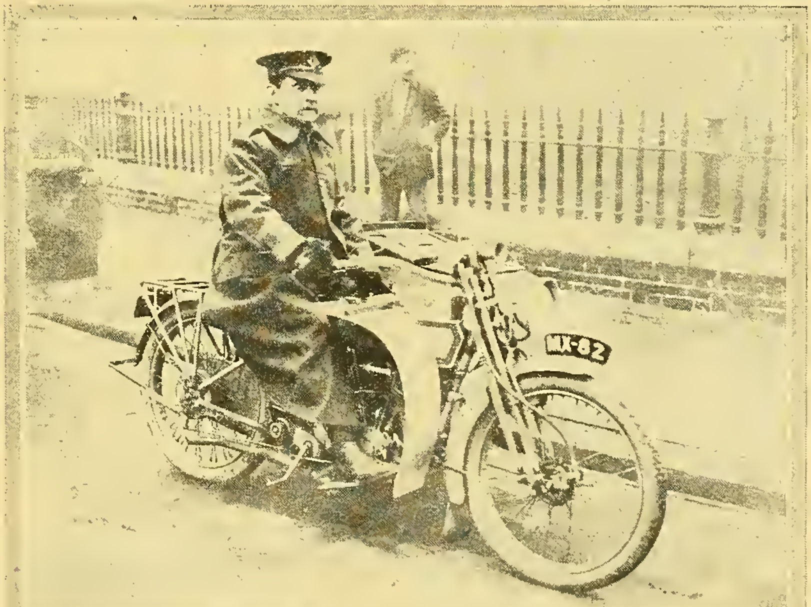
Military Entertainments.

Service entertainments behind the lines, in hospitals, and on board ship are quite a feature of the social life of our soldiers and sailors. An excellent effort in this direction, in the opinion of a former member of our staff who has witnessed many such entertainments, was a revue staged a few days ago by what is considered to be the crack squadron of the R.N.A.S. The subject of the revue was the introduction of women into the Service, and both officers and men were in the caste. One hesitates to think of what Nelson would have said had he seen air mechanics dressed as girls and parodying well-known songs instead of changing sparking plugs and such-like duties that form part of the daily routine.

Women Motor Drivers Inspected by the Queen.

The Queen inspected a large number of women, representing the Women Motor Drivers' Section of the Women's Legion, on Saturday morning, in the gardens at Buckingham Palace. There were 160 dismounted women and sixty-five on vehicles, representing 2,000 women motor drivers belonging to the Legion in different parts of the country. Five specimen vehicles were drawn up in front of the garden entrance to the Palace—a staff car, a touring car, a motor cycle for a despatch rider, a box-body van, and an ambulance.

The Queen was particularly interested in the work of the women despatch riders and learned that they "carried on" during air raids.



A Harley-Davidson, fitted with aluminium leg shields, seen at the parade of the Middlesex Motor Volunteers, last Sunday.

10,000 MILES WITH A DYNAMO LIGHTING SET.

Experiences and Technical Tests of a Lucas Lighting Set.

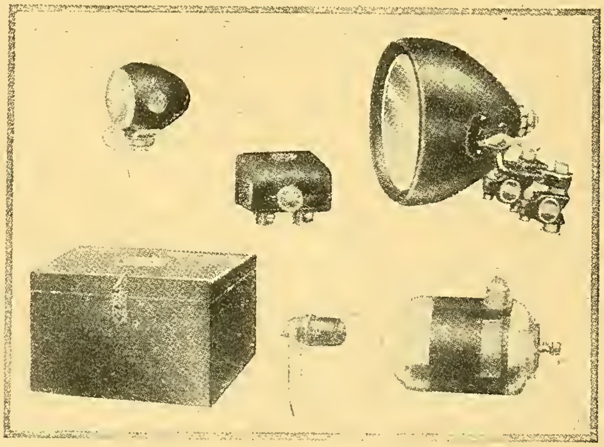
FROM time to time descriptions of electric lighting sets appear in the pages of *The Motor Cycle.* These articles generally deal with the early life of the lighting set and refer to its behaviour during that period, and it is not usual for the question of deterioration and wear to be discussed very fully. As this information is a matter of much importance to the majority of buyers, its omission is to be regretted.

During a period of thirty-four months the writer has had a Lucas dynamo lighting outfit in use on his motor cycle and sidecar, and he has made at intervals a careful examination of the condition of the various units.

The Drive.

In his experience only one feature has deserved criticism, and it concerns the drive from the engine shaft to the dynamo. The transmission is by means of a rather long chain, and due possibly to the lightness of the chain and to the high speed that it attains, the rollers have persisted in breaking. Each chain has had a life of about 2,000 miles only, which performance falls far below that of all the other parts of the lighting set and of the motor cycle itself. In comparison, the original driving chains of the latter are in use after 10,000 miles and they still show no need for replacement. In later models of the motor cycle concerned a Whittle belt drive has been adopted, and, judging from the results obtained on car installations, this type of drive should be expected to prove very satisfactory.

The dynamo has shown absolute reliability and appears now in perfect condition. No replacements have been necessary, and nothing has been touched except for an occasional oiling and a rare "look inside" to satisfy oneself that everything is in order.



The Lucas dynamo lighting set for a sidecar outfit.

The lamps, switchbox, and wiring have given unfailing service, and there has been no call to disconnect them.

The Battery.

Storage cells form the most vulnerable part of any electric lighting set, as they are so susceptible to misuse. This danger, however, is greatly minimised in a dynamo lighting system. After the outfit had been in service for some time the thought occurred to the writer that it would be instructive and interesting to record by means of capacity tests the wear and tear on the battery throughout its life. Accordingly tests are being made at intervals, which, indicating the condition of the cells, will show finally when replating becomes a necessity.

The capacity of a battery is usually expressed as the product of the current in ampères and the number of hours during which the battery will deliver this current on discharge before the e.m.f. falls to the average value of 1.8 volts per cell. In other words, it is the useful output of the battery, and it determines the period during which the cells will light the lamps before a recharge is necessary. This knowledge, for instance, would be of great value if the dynamo chanced to fail.

In the Lucas lighting set the current ordinarily supplied by the battery, when the machine is stationary and the dynamo at rest, is approximately 1.5 ampères—assuming the user has switched his head lamp over to its reduced lighting, as he should do, and the tests described were made with this discharge current.

It may be well to point out here that the smaller the discharge current the better output performance will a battery show; and in general it will be found that the ampère hour output marked on the label is only obtained when discharging at currents considerably below the stated maximum current.

Testing Methods.

The procedure of the tests consisted in first fully charging the battery at its stated charging current of 2.5 ampères until the cells were "gassing" freely. This was continued until the voltage per cell reached the value of roughly 2.2 volts, when the charge was taken to be complete. In discharging the battery an adjustable resistance and an ammeter in series with it were connected across the battery terminals. The circuit was closed, and by means of the resistance the

0,000 Miles with a Dynamo Lighting Set.—

current was adjusted to and maintained at 1.5 ampères hroughout the discharge.

Initially and at intervals of one hour until the completion of the discharge the voltages across the battery terminals, and also across the individual cells, were measured. From these values curves of discharge were plotted.

The Tests.

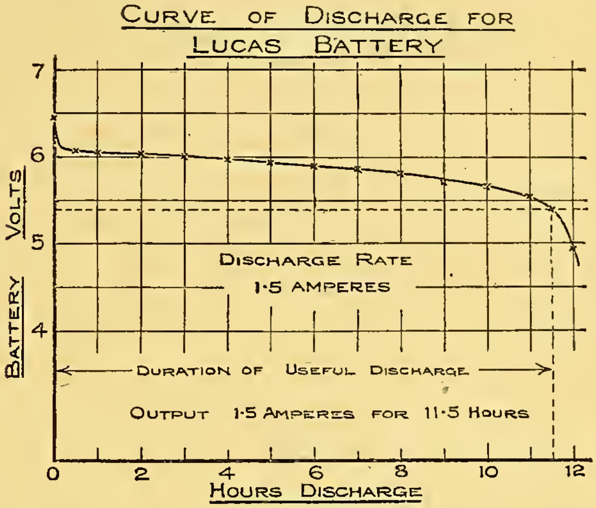
The first test was carried out in August, 1915, the second in October, 1916, and the third in November, 1917, and the values obtained in each case have been identical—a result which is most gratifying. One discharge curve therefore illustrates graphically the results of all the tests. This curve, which is shown, is of the characteristic form. Initially the voltage of the battery is 6.4. Then for a short period a rapid fall of voltage occurs, followed by a slow gradual decrease until nearing the end of the useful discharge, when the rate of fall becomes more and more rapid. A voltage of 5.4, or an average of 1.8 volts per cell, was reached in each test after discharging for 11½ hours, which gave for the battery a capacity of 17¼ ampère hours.

In discussing the results of tests of this character it is well to consider the conditions under which the apparatus has been used, in order to value its performance more truly. The mileage run, although not high on account of the many restrictions, constitutes a respectable total, and it may be taken to give a sufficiently representative test on any lighting system. Faults and weaknesses in design, materials, and workmanship may reasonably be expected to reveal themselves over this distance.

There is little doubt that the present excellent results are due in a large measure to the provision of a dynamo in the system. As a consequence, the battery is always in a more or less charged state, and it does not often reach that condition in which "sulphating" with its cumulative deleterious effects becomes appreciable.

Further, the rates of charge and discharge are never permitted to exceed values at which the plates would tend to buckle and disintegrate. These latter effects are a frequent source of poor performance in batteries fitted to self-starting sets on cars where discharges at a very heavy rate often occur.

Another factor, which perhaps has contributed to the excellent results obtained, is the periodical charging and discharging that the writer has carried out. A moderate amount of regular work is essential to keep a battery in its best condition, and it has been the practice during periods when the lamps are rarely used, as, say, in summer, to disconnect the battery at intervals and subject it once or twice to a charge and discharge at a low rate, half an ampère being the rate adopted.



The dynamo lighting system for motor cycles undoubtedly has come to stay, and, when well designed and constructed, it gives service in lighting, convenience and life second to no other system. A.K.

Wintry conditions at New Zealand headquarters. The motor cyclists have to "carry on" in spite of inclement weather. (*Official.*)

HOW TO JOIN THE R.A.F.

Provisional Regulations governing Temporary Commissions as Flying Officers.

THE following details will be of interest to the younger section of readers whose ambition it is to enter the Air Force. Many of our readers have shown the liveliest interest in all that pertains to the Air Force, and further information likely to interest them will be published as soon as it is available.

The earliest age at which a candidate can be admitted to an Officers' Cadet Wing is 17½ years, but applications can be received and decided upon earlier.

Candidates over thirty years of age are not eligible.

Applications should be made in letter form, stating full particulars regarding the applicant, and should be addressed to the Director of Air Organisation, Room 29, Air Board Office, London, W.C.2.

After March 31st applications should be addressed to the O.C. Reception Depot, Royal Air Force, London, Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Newcastle, or Nottingham, according to the district in which the candidate is registered.

Service candidates must in all cases apply through their Commanding Officer (on Army Form M.T. 393a, if soldiers).

Admission is by selection, subsequent to an interview with an officer detailed for the duty, and after passing the prescribed medical examination.

Candidates are required to be of pure British nationality, the sons of natural-born British subjects on both sides. No variation from this rule is admitted.

Civilian candidates are required to attest before entry into the Officers' Cadet Wing. Full instructions are issued to each selected candidate.

The pay of a cadet is 1s. 6d. per diem, uniform, messing, and quarters found.

The course at the Cadet Wing lasts for about two months. This course is devoted to instruction in military duties and drill, and ends with an examination in these subjects.

Cadets next proceed to a School of Aeronautics for a six weeks' course of instruction in technicalities, such as engines, appliances, the construction of aeroplanes, and theory of flight; and thence to a School of Armament for a four weeks' course of gunnery instruction. At this stage in their training cadets may volunteer for the particular type of aircraft (aeroplanes, seaplanes, airships, etc.) for which they desire to be trained.

Cadets who successfully pass through the above schools will be appointed Flight Cadets or Sergeants with pay at the rate of 7s. 6d. per diem (plus 4s. per diem flying pay) and 3s. 6d. per diem (plus 1s. per diem flying pay) respectively.

Thence they advance to Training Squadrons, where they learn elementary flying on service machines under service conditions, proceeding to air tactics, bombing photography, and artillery observation.

On graduating from the Training Squadrons, Flight Cadets are gazetted 2nd-Lieutenants, and Sergeants are promoted Technical Sergeants, with pay at the rate of 10s. per diem (plus half flying pay, 4s. per diem) and 6s. per diem (plus half flying pay) respectively.

On graduating, 2nd-Lieutenants and Technical Sergeants obtain full flying pay (8s. per diem), and are entitled to wear pilot's wings.

Whether a cadet is eventually selected as an officer appointed as a non-commissioned officer or finally rejected depends upon his progress and recommendations while serving as a cadet. Cadets may have to pass a further medical examination before they begin to fly.

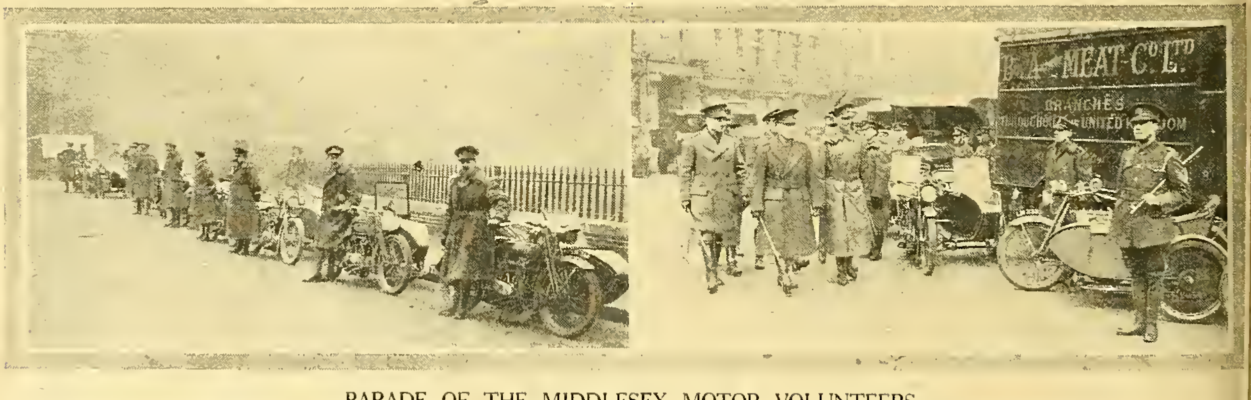
AN ATTRACTIVE POST-WAR MODEL.

A MODEL for after the war which has not been very much touched upon is a really T.T. two-stroke lightweight, having 26in. wheels, semi-T.T. bars of attractive design, and a light two-speed gear box. Most of the post-war two-stroke designs I have so far seen all tend in the direction of being heavier than their predecessors. Their designers are apparently out to produce a reasonably light and perfectly comfortable touring mount in preference to the mere runabout heretofore, but is no one going to cater for the speed merchant who wants something really light and cheap?

Some time ago I possessed a machine of the type I have in mind, and can honestly say that I obtained more genuine sport from it than any other machine I have owned. All superfluous weight was stripped even the rather heavy gear box eventually, as the second speed was seldom required, and at last the machine was so light that a temporary stoppage added to the sport of things.

One cannot help but think that a really fast lightweight, having aluminium parts as far as possible and designed throughout for speed, would meet a read market after the war.

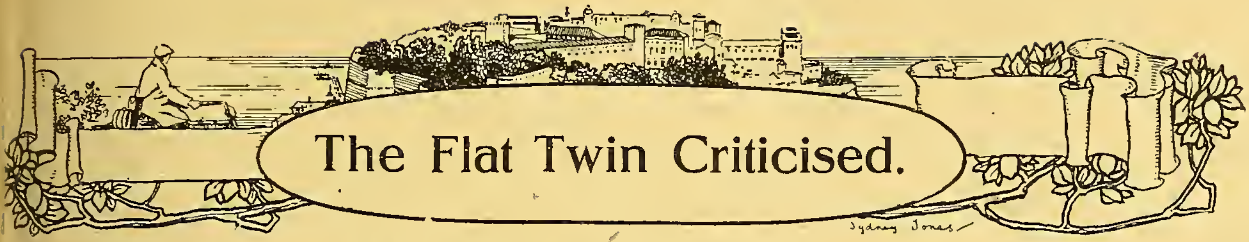
CHINOOK.



PARADE OF THE MIDDLESEX MOTOR VOLUNTEERS.

(Left) The parade of the motor cycle attachment of the 13th Company of the County of Middlesex Motor Volunteers.

(Right) Inspection by Lieut.-Col. Walter Gibbons, officer commanding the group. The parade, which took place on Sunday last at West Smithfield, near St. Bartholomew's Hospital, included commercial lorries and private cars as well as motor cycles.



The Flat Twin Criticised.

Advocating the Vertical Twin as the Best Type of Engine.

NOW that the flat twin is about to sweep the motor cycle arena of all competitors, I feel bound to express my views that this type of engine merits early grave, unhonoured and unsung. Do not ugh. I am justified by the well-known precedent of e *Skibbereen Eagle*, which, some time ago, had its e on the Czar of Russia. And think of the latter's te! It is well known by everybody, outside the otor trade, that all motor cycle manufacturers secretly eal their designs from the "Letters to the Editor" olumns, and so put the salary of a drawing office pert into their own pockets.

Therefore let me allay the anxiety of these poor men to what their post-war productions are to look like. therwise they are quite likely to fall into grievous ror, and go in bald-headedly for flat twins.

There are only three types of engine at present in ew worthy to survive on motor cycles. (1) The ngle. (2) The side-by-side twin, balanced as a single, it with even firing impulses. (3) The four-cylinder.

The Four-cylinder.

Looked on purely as an engine, the third is the st, but the manufacturers do not yet see its defects, they are not likely to supply it for some time. As on as the manufacturers realise that it is impossible supply a four-cylindered motor cycle with an ficient transmission, they will flood the market with and the public will at last get the shaft drive has been clamouring for for so long. "Just like a r." What a number of inefficiencies those words ld and make resplendent.

But as No. 1 is known to all, and No. 3 is still in e distant future, let us consider what advantages o. 2 has over the V and flat twin.

The Vertical Twin.

Over the V it scores in (1) bearing area, (2) accessi-lity, (3) torque, (4) intensity of magneto spark, (5) ction on carburetter, and (6) better cooling. It loses width of engine, and (theoretically) on balance.

Over the flat twin the side-by-side scores on (1) aring area, (2) accessibility, (3) ease of fitting into iangular frame, (4) overall length, (5) induction ping and carburetter position, and (6) better cooling. loses again on width of engine and (actually) on lance.

I contend that width of engine does not matter, as enables the final drive from countershaft to be on e same side of the machine as the primary drive, saving twisting strain on the gear box so usual in esent-day machines. Before leaving the width ques-on, let me state that the engine I contemplate is aluminium or copper *monobloc*, with steel liners, etachable head (no valve caps), exhaust valve over let in front of the cylinders, carburetter in bottom centre of block of cylinders, with induction pipe cast integral with cylinders. Such an engine, even in the 1,000 c.c. class, need not be too wide.

But the point I really wish to make clear to those manufacturers who hang trembling on my words is that torque is far more important than balance. And the parallel twin balanced as a single is superior in torque to any V and equal to any flat twin made.

On torque depends comfort of rider, and life of tyres and transmission. If anyone believes that balance plays a more important part in his comfort let him get the best balanced flat twin in the world and fix one cylinder (either by attention to plug or inlet valve) so that it only fires intermittently. He still has his perfect balance, but I defy him to believe that his machine is as comfortable to ride as a badly balanced single.

It is the even torque that really makes the difference. A parallel twin could easily be turned out just as comfortable to ride as a flat twin—at any rate, up to 50 m.p.h., which is far faster than the average tourist ever goes, in spite of what his speedometer may tell him.

I say that, with an outside flywheel, the ample width of big end bearing area, the genuine accessibility of the engine (especially if the crank case be split horizontally instead of vertically), the ease of housing in a strong frame, the simplicity of properly warming the carburetter and induction pipe, as well as the ease of cooling equally both cylinders, make the parallel twin with even torque well worth a place in the post-war policy of any manufacturer. And I prophesy that the scramble to make and discard flat twins will be very like the scramble to make and discard the worm drive, which took place in the car world a few years before the war.

A TILTER AT WINDMILLS.

THE DIRGE OF THE CARBURETTER.

You thought you were above decay
Upon your pedestal of clay.
The tricar vanished in its pride,
Accumulators came, and died:
You saw the trailer's final rout,
Hub gears came in—hub gears went out,
And belt drive tottered on its throne.
Of all the parts you stood alone.
Each year your pipes were cankered through
With juice of still more heavy brew.
With substitute we wreaked our wills.
Your float was caked with petrol pills.
You even swallowed paraffin,
But now at last your checks are in.
Begone! The weak must leave the race:
A *gas tap* comes to take your place.

E.P.B.

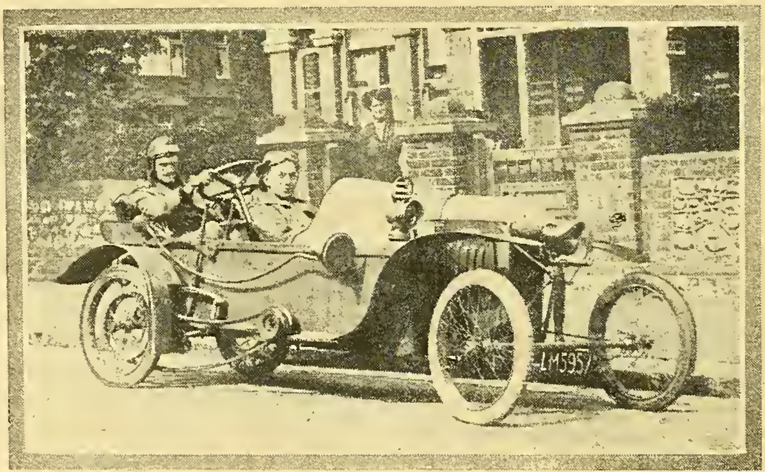
HOW ARE THE MIGHTY FALLEN.

A Motor Cyclist's Experiences with a Cycle Car, and some Comparisons.

THIS is the sad story of a fall from grace—of a time when I was lured from my loyalty to the single-track machine by the specious attractions of four wheels to sit over, and the right to say in an off-hand manner "my car."

This vehicle, which I drove without sustaining any permanent injury for five mad months, was called a "Sabella." There is no need for me to dilate upon her appearance, you may study it for yourself. She taught me a great deal about motors, and she provided more thrills than were ever undergone by Elaine, or Sexton Blake. I shudder now to think that this photograph was taken fifty long miles from home, and of what intervened before I got there.

In an ill-starred hour I sold my reliable but overgeared Rudge-Multi, and drove this horror—this mechanical impossibility—right across London on a Saturday morning. She started by a pull on a leather strap wound round a pulley, and jerked upwards. When the strap did not break, with resultant shocks to one's nervous system, occasionally she started. Her aged Bosch magneto was a prolific source of trouble. She had no clutch, and the drive was engaged by the tightening of sliding pulleys on the double belt drive. Occasionally a belt would fall off and trail, like the first serpent, in the dust. Pedestrians would wave frantically at you, and you would descend and put the thing back (not daring to stop the engine, which raced furiously the while, with a sound as of all Vulcan's smithy coming from the loose dogs). Clambering back hastily before her 8 h.p. Jap engine overheated, you let in the drive. The engine often chose to stop dead. After a lapse of time best indicated in the way favoured by Mr. H. G. Wells when denoting a crisis . . . . she would be got going again.



The cycle car on which the adventures occurred.

Speed—Useful and Otherwise.

Theoretically of infinitely variable speed, her normal was 30 m.p.h. This was occasionally awkward in traffic, as the engine had to be cut off at intervals. This sounded racy, but the dread of a total stoppage blighted any satisfaction to be got that way. Her steering was by steel stranded cable, which wound round numerous ingeniously placed bobbins, fraying through on an average once in six weeks or so. I can still recall the awed feeling that came over me when at the bottom of Westerham Hill, which I had descended in the manner of Boillot on the Grand Prix Peugeot, I found that of the three strands which com posed the cable, only one remained. And my sub sequent tame progress home.

Some Advantages.

Once she baulked half-way up Bury Hill, and w sojourned for a while in the chalk quarry there, smol ing our pipes until such time as her almost incar descent engine should cool down. Her one goo point was her freedom from vibration: the tande seating, with its attendant long wheelbase and ham mock seats, gave real comfort. But the passenger i front experienced sensations akin to those felt whe making a trial run on a torpedo boat destroyer, fo the madly pulsing engine was right under the incline footrests. When the tanks were not leaking through th terrific vibration of the badly mounte engine on its ove light wood fram the brakes require attention, or th wheels (equippe with ball bearing as tiny as those i the head of a pus bicycle) were out o track. She a t tyres. In greas weather her narro tread and habit o insouciantly waggin her tail kept yo heart in your mout If she ever had go over there is n much doubt th she would have rolled like a shot rabbit.

On occasion she would get a good mood, and tal the bit between her teeth. One morning very ear I came up from Worthing. Even the Findon tr was not working at that hour, and there was no nee for that restraint that she loathed so much. I s the throttle wide open and let her have it. I wou not tell you how long we took to get to Town, but is a memory to be cherished now that motoring h become a crime!

On Handcross one day returning from Brighton t vibration set up by her efforts on the hill fractured h petrol feed pipe hopelessly. She shed tears of t best Shell copiously (I never dared check her co sumption), and it was the dickens of a job to mend h Later on the way home she smashed a valve. T mushroom fled heavenwards through the front cylind I chartered a small boy collecting the wherewithal fertilise the garden on one of those ambulant Ta sugar boxes on pram wheels to help me to pu "Sabella" to a garage. He was manifestly u willing to abandon his cargo in favour of my cy car, but the offer of fourpence decided him.

I have never sat in a cycle car since, and never v again.

R.H.B.

LETTERS to the EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

CARBURETTER ADJUSTMENT.

Sir,—The letter by H. A. Connell, *re* failure to obtain the full power from a Binks, causes me surprise. I have had a Binks fitted to a standard 1912 Triumph, and I am perfectly satisfied with the results—easy starting, flexibility, slow running, speed, acceleration, and plenty of power even with a main jet. The jets used were 0, 3, and 7.

Being so pleased with the Binks, I fitted one on a T.T. Singer, with the same results.

Is H. A. Connell sure it is the fault of the carburetter and not of the machine? I may also say that I have used even a 10 jet; in fact, jets as they are not intended to be used. If at all possible, I should very much like to have a try at H. A. Connell's Binks. PRIMUM MOBILE.

Widnes.

THE A.A. AND THE UNITED COUNCIL.

Sir,—I enclose herewith a copy of a letter that I have addressed to the Automobile Association and Motor Union in reply to the statement issued to the press under the signature of the Secretary of the A.A.

HORACE WYATT.

[COPY.]

THE UNITED COUNCIL OF MOTOR USERS, PRODUCERS, AND DISTRIBUTERS.

Secretary's Office, 39, St. James's Street, S.W.1,
March 14th, 1918.

Dear Sir,—My attention has been drawn to a statement appearing over your name and dealing with the views of the A.A. in respect of the United Council of Motor Users, Producers, and Distributers. I am particularly glad to note that the A.A. welcomes the co-operation of kindred bodies wherever and whenever the interests of the reasonable motorists are concerned, also that the committee of the A.A. are in entire sympathy with the suggestion of united action by all bodies concerned on matters pertaining to the production, distribution, and use of motor vehicles which may be affected by legislative or other proposals. Further, that the A.A. has at all times worked amicably with the motor producers and distributers.

Under these circumstances it appears that the objection of the A.A. to co-operate upon the suggested Council was based almost entirely, if not quite, upon a reading of one specific paragraph in the terms of reference of the Council as originally defined. This paragraph reads as follows:

"In respect of legislation, kindred matters and technical questions in relation thereto, to use its influence to discourage any organisation represented upon the Council from acting in a manner calculated to impede the policy or to injure the interests of any other organisation so represented, and to encourage united action and mutual support between all these organisations."

It is, of course, fully recognised by those who desire to collaborate that the Council is as yet in an embryonic form. May I suggest, therefore, that the A.A. could consider nominating any member or members of its committee to meet the Council as at present constituted, with a view to considering whether any apparently objectionable features in the terms of reference of the Council could not be eliminated by joint agreement, and the reason for the abstention of the A.A. thus removed?

I think your committee will agree, on further consideration, that the all-important matter of good roads referred to in your letter is of importance, not only to the motor user, but also to the producer and distributer, inasmuch as the markets of these latter are largely dependent upon the quality of the roads available for their vehicles; similarly it is in the interests of the producer and the distributer that motoring should not be discouraged by heavy taxation, and that ample supplies of cheap fuels should be made available. Thus there appear to be many subjects with regard to which discussion between motor users, producers, and distributers might reasonably be expected to lead to some unanimous decisions, which all could unite in putting into effect.

Admittedly there are points upon which the policies of the various sections mentioned must necessarily differ, but in many such instances private discussion may, I believe, serve to prevent unnecessarily antagonistic statements from being made in public. The paragraph quoted above, to which the A.A. takes exception, was really intended, as I understand it, to provide that public action of a hostile character should not take place until the matters in dispute had been privately discussed, and those who might be inclined to be unreasonable had thus been given an opportunity of reconsidering their attitude and taking a reasonable view. As a tentative suggestion that might form a basis of discussion, I do not think it unreasonable to suppose that those who have decided to support the Council would be prepared to modify the paragraph to read:

"To discourage any organisation represented upon the Council from acting in a manner calculated to injure the interests of any other organisation so represented until the views of both parties have been made a subject of discussion at a meeting of the Council; also to encourage united action and mutual support between all these organisations so far as may be found compatible with the effective freedom of action of each organisation in the interests of its membership."

I trust to hear from you that the A.A. will be prepared to discuss this or some other amendments, and should be pleased to convene a meeting of the Council for the purpose of such discussion upon a date convenient to the A.A.

HORACE WYATT, Hon. Sec. *(pro tem.)*

The Secretary, The Automobile Association and
Motor Union,
Fanum House, Whitcomb Street, W.C.

PETROL AND OIL ECONOMY.

Sir,—I begin to fear that his machine-gunning experiences are having an unhappy effect upon "Ixion." At least that is the only explanation I can think of for the curious statements he has been firing off recently. Only a few weeks ago he was talking about his "freak" gear of 4½—1. Now I can see nothing "whimsical or odd" (Webster) about such a gear, even if his machine does weigh over 300 lb., which I doubt; in fact, I doubt if any 3½ h.p. three-speed—and far less a four-speed—machine is supplied with a much lower top gear as standard for civilian use. Again, even if "heavy stress" is not laid on his figures in a recent issue *re* "per b.h.p. hour," they are extraordinary. He apparently refers to a machine in the 550 c.c. class to give 3 h.p. at 20 m.p.h., and even at that the petrol consumption is high, while the oil is terrific. If he does not believe me I refer him to the various letters early in 1914 on the cost of running. In the officially-observed trial of the Clyno and sidecar in 1914, carried out, according to your report, in bad weather, heavy roads, and strong head winds, the oil consumption was 504 m.p.g. If "Ixion" has based his figures recently on an actual machine, we must surely look there to find the freakishness, for I am sure they are not the figures for average machines, though big "revs." do not spell economy. AC 154.

Nuneaton.

LAMINATED SPRING FRAME.

Sir,—I beg you to set the minds of Messrs. Baker, Ltd., at rest. My design was not patented, because at the time I first considered it I was in France; but I sent it because I thought it might be of interest to your readers. Therefore, Messrs. Baker, Ltd., have no further need to worry.

(Pte.) A. F. MARKHAM.

PETROL AT EASTER.

Sir,—A friend of mine informs me that there is a movement amongst motorists to allow them to use petrol that they have in stock for pleasure this Easter holiday. A great many motorists still have a supply of petrol and substitute by them, and would be glad of a little recreation in these hardworking times, especially those engaged on munitions and shipbuilding. For one thing, it would enable them to travel to their homes more comfortably than by a crowded holiday train and restricted railway service; and a little of their holiday could be spent in the pleasant country, enabling them to return to their work much refreshed for further exertions. The Government is asking for money for War Loan, so I think this would be a good way to get it, as I suppose the Inland Revenue taxation money could be claimed for war purposes. R.W.W.

Stockport.

[We have already stated that, so far as we are aware, there is no truth in the rumour.—Ed.]

SIMPLE TYPE CARBURETTERS.

Sir,—I do not know if "Chinook" has tried the carburetter design he describes in the last issue, but I have. Somewhere about 1901 I protected a very similar design, and rode a motor bicycle fitted with it. The control was the same, also the working of the needle valve and arrangement of the thin mushroom diaphragm. The only difference in my carburetter was the absence of a flooding device, and the control of the top rod was by screw instead of a cam.

This carburetter gave very good results up to a certain point. Its main fault was that the petrol feed was too sensitive. For instance, supposing one were ascending a hill, and more power were wanted, the needle valve was opened, and this was always followed by a rush of petrol, which upset the mixture. A very slow thread control was then tried. This proved better, but it still required very delicate manipulation, and was finally abandoned in favour of a float fed jet as being more certain in action.

I do not think every carburetter maker would employ a float chamber and float if the extra expense and complication could be avoided.

I believe in a variable jet carburetter, either by needle or otherwise, in conjunction with a float feed, but nicety of control will be difficult to obtain without a float feed and a throttle.

One drawback of the simple form of carburetter suggested by your contributor is that the engine cannot be made to run slowly. This may not matter so much in the case of a two-stroke. My experiments were made on a four-stroke, and there were practically no intermediate speeds possible with this type of carburetter. You will readily see that the diaphragm needle and spring have to be very light to respond to small differences in atmospheric pressure. When they are made light enough to do so, they are so fragile that they are hammered out of shape in no time.

When the engine was stopped, the main petrol tap would always require to be closed. No spring-controlled needle valve would hold the petrol unless the spring were so strong that the engine suction would barely lift it.

I hope these experiences will be of some use to "Chinook" and others. EXPERIMENTALIST.

ANOTHER LIGHTING PROBLEM.

Sir,—May I beg a little space in the "Blue 'Un" to express my sincere thanks to those of my fellow readers who have so kindly replied to my letter *re* wiring a solo mount, in your issue of February 7th, thereby getting me out of the difficulty. The designs seem easy and efficient, and I shall try them at the first opportunity.

I am, however, a little puzzled over the following, and would esteem it a great favour to have a further explanation: How does "Allon" get his variable light, and how can I get the same with my ordinary fixed lamp socket? I could convert my holder to take the bulb he mentions. Will Mr. Wilberforce Durell tell me what is one ohm resistance? Would the same current be used with resistance thrown in as with it out—in other words, would the resistance use any current? A diagram of how the one ohm resistance and key switch could be easily made, what sort, and how much wire to use would be gratefully accepted. Mr. S. I. Heale's letter I perfectly understand, except the eight to ten ohm resistance, which I trust to have explained.

(Sec.-Lt.) R. PERCY, R.F.C.

["Electricity and the Motor Car," by Hutton, will explain all these difficulties.—Ed.]

RESPECTIVE PETROL CONSUMPTIONS.

Sir,—Surely "Ixion" is a little off the lines in his figures for petrol and oil consumption. At the outset he appears astonished that the aero engine registers a better figure for "pints per b.h.p. per hour," working on practically full load, than the motor cycle engine on an average throttle opening of about one-third. I should have thought that it was practically universally known and appreciated that running on anything less than, say, threequarters full load was comparatively wasteful of fuel. The heat efficiency of any internal combustion engine is not good at light loads. I venture to suggest that a well-designed motor cycle engine will register practically as good a figure for "pints per b.h.p. per hour" at seven-eighths full load on the test bench as an aero engine also at seven-eighths full load on test under similar atmospheric conditions.

"Ixion" shows that whilst the aero engine registers .54 pint per b.h.p. per hour, the motor cycle engine does very little worse, viz., .66 pint per b.h.p. per hour; and I would suggest that he is comparing an aero engine almost fully extended and at its most economical r.p.m. with a motor cycle engine on about two-thirds load.

In the case of his light car of 10 h.p., he is surely "miles" out with a figure ".4 pint per b.h.p. per hour." No reasonably built light car requires an output of 10 b.h.p. to drive it at 20 m.p.h., on practically level roads as an average, to give 40 m.p.g.

The average output might be 5 b.h.p. to give an average of 20 m.p.h. over sufficiently easy roads to obtain a consumption of 40 m.p.g. An efficiency figure of ".8 pint per b.h.p. per hour" would be about correct and in accord with actual tests. If the same light car engine were tested on the bench at seven-eighths full load at, say, 1,800 r.p.m. it might register ".56-.6 pint per b.h.p. per hour." It might then be developing about 16 b.h.p.

J. W. G. BROOKER.

A damaged aeroplane being taken for repairs after a bombing expedition.

MOTOR CYCLING FOR THE MAIMED.

Sir,—As a regular reader of your valuable paper, I have ead considerable correspondence *re* "Motor Cycling for the Maimed." I have faint remembrance of letters from various of your readers, some considerable time back however, of machines adapted for the use of riders who have lost a hand. I am afraid my memory is not so good as it might be, as I have quite forgotten what alterations were made; probably I did not make careful note, as I was sound in wind and imb in those days. All late correspondence on this matter appears to deal only with those unfortunates who have lost egs. I wonder if any of your readers can perhaps help me and probably others who have now lost their left hand. I, personally, for the sake of simplicity, favour the 4¼ h.p. single combination with three speeds, kick start, and hand-controlled clutch—rather a problem to get over. I do not know what difference an artificial hand would make in case of control of such a machine. Certainly a machine of the Enfield type would lend itself more readily to conversion; the gear, for instance, could no doubt be operated by the old heel and toe method, as used in clutch control. But then you are faced with the difficulties of starting, insomuch as it (the Enfield) is hand started, and I do not quite see how the exhaust valve lifter is going to be worked.

ARTHUR V. BURTON.

Sir,—As a constant reader of your valuable paper for the past nine years, in New Zealand, France, and England, perhaps I may be permitted to air my views on one or two of the much-discussed subjects of the moment.

I have owned seventeen motor cycles, a Carden monocar, and a G.N. cycle car since first bitten by the motor "rabbit," so have had a fair chance to form an idea of the "ideal" motor cycle—if such a thing exists.

As regards "motoring for the maimed," in this hospital we have four motor cycles owned by men with one leg, and I recently disposed of the second machine I have owned since disposing of my left arm in France, last June. We all ride standard machines—Rover, Humber, Rudge-Multi, and Bradbury—the only alterations needed being for the legless riders, who fit a hand lever (as per Indian clutch control) to the foot brake or clutch—depending, of course, upon which leg is missing. We all use sidecars as a rule, but often have a run solo, with more or less luck as regards spills. Personally, I find it just as easy to manage any of the machines, with sidecar especially, as it was with two arms.

As regards machines for the Colonies, may I, as a keen rider having no connection with the trade in any way, put a question to home manufacturers, viz.: "Can they expect to turn out their 3½ h.p. singles or 8 h.p. twins (guaranteed to shake the 'innards' out of anybody, not made of cast iron and rubber, over ten miles of back-country N.Z. roads) to be in the same street with the spring-frame Indian, whose many merits are too well known to need detailing here?" Well, till they do, the Yankee machine will certainly hold precedence with most of us who have tried both. Hoping you will pardon the length of this discourse, and wishing you the success you well deserve,

Weybridge. NEW ZEALANDER.

ROTARY ENGINES FOR MOTOR CYCLES.

Sir,—I receive *The Motor Cycle* out here every week; it is most popular with the troops, especially with those who have anything to do with motor cycles.

I agree with "Ixion" on the absolute futility and madness of thinking of applying a rotary engine to a motor cycle. A rotary engine is a horrible affair, and only suitable for one purpose, *i.e.*, where high power is needed at a very small weight and space, and where no restrictions are placed on fuel and oil consumption and time spent on overhauling. It would be a fearful affair decarbonising and keeping in repair a multi-cylinder rotary engine when reduced to the tiny size it would be for a motor cycle. Incidentally, too much comparison has been made between aeroplane and motor cycle engines lately. They do not work under anything like the same conditions. Also it is ridiculous to compare the power to weight ratio of an aeroplane engine of, say, 200 b.h.p. with that of a motor cycle, which would be 10 h.p. at most! Any engineer knows that the weight per horse-power grows rapidly as the engine size diminishes.

B.E.F. R. BAMSELL.

A POST-WAR IDEAL.

Sir,—I should like to express my opinion as to the mount I should most favour if it were upon the market, and that is a large single two-stroke. I have been an enthusiast of the two-stroke for some time, and have longed for a machine to be made something after this style: Horse-power 4¼ (or thereabouts), single two-stroke engine, like the Radco as regards simplicity and efficient running; Zenith-Gradua countershaft gear, giving ratios from about 4½ to 10 to 1; Triumph frame with Radco spring forks; Rover silencer; T.T. handle-bars, celluloid covered, like the Enfield. This would be my ideal, and I should like to hear of any criticisms and views on a cycle like this; also of anybody who may be looking for a mount something after this style.

London, N. J. A. JEAPEZ.

Sir,—It is to be hoped that when manufacturers are considering new types to be produced after the war they will not sacrifice efficiency to cheapness, on which latter consideration so many of your contributors lay such stress. There are many buyers who would gladly pay £10 or £20 additional for a reliable, comfortable machine, with plenty of power but of moderate speed, easily controlled and started, and capable of being driven at a walking pace.

Just prior to the war, for reasons of health, I took a house in the country, at an elevation of 500 feet, about ten miles from my place of business, without any railway communication. For three years my Panhard car has taken me to and fro daily without trouble. I drive myself in each morning and back each evening. My consumption of petrol was about thirty gallons per month. This convenient arrangement lasted until my petrol allowance was reduced to ten gallons per month.

It is no easy matter, when one has passed sixty, to make a new departure, and, against the warnings of all my friends and family, I determined to try a motor cycle, having been a rider of the push bicycle from the far-off days of the iron-tyred boneshaker. My first venture was a 3 h.p. two-cylinder machine, which ran delightfully when it did run, but was constantly in dock for trivial breakages, which was most annoying and expensive. Recently I was fortunate enough to come across a new 3½ h.p. single-cylinder Rover, which has given me no trouble at all, and I now run in and out daily with the same regularity that I was accustomed to on my car.

The pleasure of riding a motor cycle, solo, is so great that after the petrol restrictions are removed I shall probably continue to use the cycle when weather permits. The cost of a motor cycle, when compared with a car, is so small that one can easily afford any reasonable addition to the cost to get additional comfort. I should like my clothes to be protected from oil and the machine from mud. It would be a great advantage if the clutch could be controlled by hand as well as by foot. Less noise when the engine is running with the clutch out would be pleasant. The three-ribbed tyres fitted to both machines have proved quite satisfactory, and I have not had the semblance of a side-slip. The simplicity of the single-cylinder machine, when combined with the chain-cum-belt drive, appeals to me, and the admirable Brooks saddle appears to absorb all vibration, if there is any. SENEX.

Bridgwater.

STANDARDISATION.

Sir,—Being an interested reader of your paper, I have noticed several times articles on "Standardisation." I think the idea is all right, as regards small fittings of machines, but I hardly think the subject will be a success with complete machines. No doubt "standardisation" is *the* thing as a war measure, but it is to be hoped that after the war firms will continue with their original designs. I think we may take it for granted that a standard machine would be much cheaper, owing to quantity production, but the crux of the matter is that scarcely two riders have the same opinion of one machine. Again, makers have innovations on their machines which they will not willingly scrap; also, with standardisation, initiative would tend to become stagnant.

At present, in England, our people seem to be "standard mad"—clothes, boots, food, and everything generally. Let us hope that, after the war, one will be permitted more freedom of action, and it is then we shall see the results of original designs, which have been on the drawing boards so long. SAPPER.

QUESTIONS & REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Magneto Voltage.

? Will you please let me know the voltage of a high-tension magneto?—B.W.G.

The maximum voltage of a high-tension magneto varies from 7,000 to 10,000 volts, depending upon the strength of the magnets, the number of revolutions per minute, etc.

Altering the Lubrication System.

? I purpose putting a copper pipe from my oil pump to the crank case. Do you think it advisable to bore a $\frac{5}{16}$in. hole in the crank case? I do not care for the petrol-oil system. My motor cycle is a $2\frac{3}{4}$ h.p. two-stroke fitted with an Armstrong three-speed hub gear. There is already a pump fitted, but the measure has been lost. Do you advise me to fit this as I suggest for lubricating the engine, and where should the hole be bored, and what lubricating oil should I use?—R.A.S.

There is no reason why you should not tap your crank case in a suitable place and fit a union, so that you can fix a pipe and oil directly into the crank case, or allow a constant supply to be maintained therein through a drip feed. The hole should be preferably high up in the crank case, where there is plenty of metal. A good brand of air-cooled engine oil should be used.

Cracked Valve Seating.

? I have a Morgan with 1914 A.C. 8 h.p. J.A.P., and find that one exhaust valve guide is cracked (at the top inside cylinder). I want to remove this. It is evidently screwed in, and I am expecting to find it very tight. Would you advise soaking round it with paraffin or heating with a blow lamp? In this case, I presume, one would heat the cylinder around the guide. The valves also are very pitted. Is it better to send them to the makers to be refaced? I do not think I can ever grind all the pits out. —G.T.D.

If the valve guide is too tight to be removed by direct unscrewing, you should try soaking it well with paraffin, and only when this has failed try a blow-lamp. If you have to use a blow-lamp, heat the cylinder around the guide, and take care that the guide itself does not become heated, otherwise the guide also will expand, and, of course, there will be no advantage. Any good mechanic should be able to skim up the valves of your engine on a lathe, and there is no need to send them to the makers.

An Allotment Holder's Queries.

? I wish to alter my $3\frac{1}{2}$ h.p. Humber and sidecar so as to come under the free-of-duty trade requirements. (1.) How will this affect the registration of the machine? I fitted the sidecar since registering the machine. (2.) I propose to use this machine for taking tools and stuff to allotments which I have, and also for the benefit of my friends who have allotments. I have thirty rods under cultivation myself, and last year the machine was very useful for transporting soot, manures, and tools, and conveying produce home. When not required for this purpose it will very likely be lent to a local tradesman for the transport of goods. I purpose putting on the carrier my name and address and occupation, say allotment holder, or would it be better to put engineer, which is my real occupation? (3.) I propose to run the machine on coal gas, mainly with a little paraffin as a stand-by. I suppose I should have to obtain a gas permit. The machine has been run on paraffin for the last two years, including some long runs, and I still have about six gallons of petrol left from my allowance.—T.W.S.H.

(1.) We think your best plan would be to write to the local registration offices and explain to them just what you are doing with regard to your machine. We do not think it will be necessary for you to do more than this. (2.) It really does not matter what line of employment you mention on the sidecarrier. Only your name and address are essential, painted in letters not less than 1in. in height. There, however, may be some difficulties with the police if you loan the machine to other tradesmen. (3.) You will have to write to the Petrol Control Department, 19, Berkeley Street, London. W.1, for a permit to run on coal gas, stating for what purposes you intend to use the machine. Also you may not run the machine on any liquid fuel without a permit.

THE LIMIT IN PASSENGER CARRYING.

A four-passenger sidecar attached to a Reading standard. The scene is in the Italian Alps, at a height of several thousand feet.

(*"Motor Cycle and Bicycle," New York.*)

Hints on Maintenance.

(1.) What is the best substance known to you for cleaning rust off the rim of a wheel? (2.) Do you know anything better than aluminium paint for putting on rims so as to give a bright finish? (3.) Are soldiers on leave allowed to use a motor bicycle? (4.) Is vaseline satisfactory to put on rims after they have been cleaned?—W.S.D.

(1.) There is nothing better than coarse emery cloth. If the rims are plated, petrol is some use; but if they are in bad condition, there is nothing that will clean off the rust which will not also remove the plating. (2.) Aluminium paint is satisfactory, and we do not know of anything better than this for the purpose. (3.) Yes; provided application is first made to the Petrol Controller's Department, 19, Berkeley Street, London, W.I, for a permit, which is, however, granted only to soldiers on leave *from one of the fronts.* (4.) After the rims have been cleaned of rust they should be painted, preferably with black paint. If vaseline is applied t should only be used on the bright part, and must not touch the tyres.

The Effects of a Plug Adapter.

I have a lightweight motor cycle of about 1¼ or 1½ h.p. (1.) After two miles or so it will overheat and misfire very badly—in fact, sometimes it even comes to a standstill. The compression is poor. There is an adapter on the top of the cylinder to take the plug, which leaks. Do you think this would cause the trouble, and why is the adapter necessary? The adapter is L shaped and screws into the top of the cylinder. If it were not fitted the plug points would project into the compression space inside the cylinder. Do you therefore think it is really for "pocketing" the plug? (2.) The engine is fitted with an automatic inlet valve. What strength of spring should I use, and what is the correct lift? (3.) What size of carburetter jet should I use (B. and B. old pattern)? (4.) When I accelerate on the road or on the stand the engine seems to choke up, and starts to misfire badly. What is the cause of this? (5.) The magneto is driven by a skew gear on the flywheel, and there is an arrangement for shifting the armature backwards or forwards to get the advance and retard. What is the proper timing for this class of machine? (6.) What speed should this cycle be capable of on a run of, say, thirty miles? (7.) I wish to remagnetise the magneto. A friend of mine tells me I can do this quite successfully with a battery. I have got a four volt accumulator, but I should imagine I would also require some sort of coil. Please let me know if I can remagnetise the magneto myself.—R.W.W.

(1.) The adapter might well cause misfiring due to leakage. We do not think one should be necessary unless it was to take a special plug for which there was not sufficient clearance in the ordinary way, and undoubtedly the adapter causes pocketing. We should think there would be no difficulty in getting a small size plug. (2.) The lift should be about $\frac{3}{32}$in., and the strength of the spring should be such that when the valve is shaken violently in the hand it should only just open. (3.) We should think that a .026 jet would be about the size. (4.) Probably too large a jet is fitted. (5.) The timing is the same as for any other small machine, namely: Place the piston exactly on top of the compression stroke and connect up the magneto with the points just about to break and the ignition lever fully retarded. (6.) About 18 m.p.h. if the roads are fairly flat. (7.) We fear you cannot remagnetise the magnets yourself, and certainly not with a battery.

An Unsatisfactory Exchange Deal.

Some weeks ago I advertised my Rex combination for sale, or exchange for lower power. I received a reply from a person offering me a 1913 model Premier, and came to terms, provided the machine were in good running order. When the machine arrived I could not start it; I have tried several times. I at once wrote to the vendor telling him I was dissatisfied with the bicycle, and asking him to return my combination, as I was not pleased with the looks of the bicycle. I thought it was an earlier model than he stated. I wrote to the makers, and they informed me it is a 1910 model (the man stated it was a 1913). What course should I take to procure the return of my own machine?—J.C.

Your course of action should be perfectly clear and straightforward. Write to the man who has your machine, demanding its return, and stating that if you do not hear from him within a certain time you will be compelled to put the matter in the hands of a solicitor. You will have no difficulty in obtaining the return of your machine through a court of law.

Accumulator Queries.

Will you please give information on the following? I have bought a set of four accumulators for lighting my combination. (1.) How can I tell the voltage and amperage, as they are not marked on the cases? Each accumulator has four grey and three brown plates. (2.) At what rate should they be charged when connected in series in a case?—J.W.

Each cell of an accumulator gives, when fully charged, 2.2 volts; consequently the total voltage of any accumulator is 2.2 multiplied by the number of cells. The ampère hours can only be obtained from actual test, viz., if you connect the accumulator to a lamp of the same voltage as the accumulator the number of hours that the lamp is fully lit multiplied by the ampèrage of the bulb will be the capacity of the cell. It is impossible to give the charging rate without knowing the rate of discharge; consequently, your best course is to charge the accumulator at a fairly low rate, say from .5 to 1 ampère, until the accumulators show by frothing and by the reading of the voltmeter that they are fully charged.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

GREATER NEED FOR ECONOMY.

During 1918 the restrictions on the import of paper and paper making material are very drastic, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week.

Repairing Petrol Tanks.

(1.) I have read on several occasions in your "Questions and Replies" column, when you have advised readers as to the best means of finding leakages in petrol tanks, that you have also advised them to get the soldering done by an expert, owing to the great danger. Now what puzzles me—and this is my first question—is wherein does the danger lie, provided the tank be empty? (2.) Please tell me the best way to remove the belt rim of a modern B.S.A. big single chain-cum-belt drive, in order to replace broken spokes on that side of the driving wheel.—D.C.

(1.) The danger is in soldering the tank when it contains petrol vapour, which may remain after the petrol is emptied out of the tank. We had a large tank to solder one day last summer, and drained it carefully, leaving it to dry in the sun all day. We then found it could be soldered with perfect safety that evening. (2.) So far as we can recollect, the belt rim is spoked on to the wheel. If this is the case, the short spokes holding the belt rim must be removed. In replacing the belt rim great care should be taken to see that it is true. See also "A Reader's Reply" on this subject in *The Motor Cycle* of February 21st.

EXPERIENCES WANTED.

"A.V.B." (Slough).—Abingdon King Dick engine and Wolf combination. Reliability, etc.

RECOMMENDED ROUTES.

LEEDS TO YARMOUTH.—H.P.
Leeds, Pontefract, Doncaster, Retford, Newark, Sleaford, Swineshead, Long Sutton, King's Lynn, Swaffham, Dereham, Norwich, Acle, Yarmouth.

CARLISLE TO GLOUCESTER VIA BLACKBURN.—H.B.
Carlisle, Penrith, Shap, Kendal, Lancaster, Preston, Blackburn, Bolton, Warrington, Tarporley, Whitchurch, Wellington, Bridgnorth, Kidderminster, Worcester, Tewkesbury, Gloucester.

ASHFORD TO LEEDS.—W.P.
Ashford, Maidstone, Chatham, Gravesend, ferry to Tilbury, Romford, Waltham Cross, Ware, Huntingdon, Stamford, Grantham, Newark, Retford, Doncaster, Pontefract, Leeds.

Catalogues Received.

A well-got-up list of Pedley motor cycle tyres, inner tubes, tyre accessories, such as repair outfits, inflator tubing, Pedley motor-cycle belts and belt fasteners, has recently been published, and a copy may be obtained on application to Messrs. John Pedley and Sons, Ltd., Oxford Works, Great Charles Street, Birmingham.

We have recently received a copy of a new spare and replacement parts list from Messrs. Butterfields, Ltd., of the Levis Motor Works, Stechford, near Birmingham. The list is attractively got up, and anyone interested may have a copy on application.

Gas Filling Station.

We have received a map, scale four miles to the inch, of gas filling stations situated within forty miles of Manchester, issued by Messrs. Brannen and Co., 43, Edge Street, Shudehill, Manchester. Under the name of each town the address of the gas charging station is given, the price of gas per 100 cubic feet, and the hours at which the station is available.

Liquid Fuels.

"Liquid Fuels for Internal Combustion Engines," by Harold Moore, M.Sc.Tech., F.R.C. Crosby, Lockwood and Son, 2, Stationers' Hall Court, Ludgate Hill, London, E.C.4. 12s. As is claimed by the author, the book is more for engineers and chemists than for the average motorist, but there is a good deal in it which cannot fail to enlighten the ordinary reader which is clearly understandable by the lay-mind.

The book deals with liquid fuels for three types of engines. (1.) Engines fitted with carburetters (generally known as petrol motors; these, of course, include motor cycle engines). (2.) Engines fitted with simple vaporisers (generally known as paraffin motors). (3.) Engines fitted with fuel pumps and atomising devices—that is to say, semi-Diesel and Diesel engines. The chief use of the book is that it tells us what fuels may be used in internal combustion engines, how they are made, and of what they consist. It also deals with the important question of fuel after the war, and there seems to be no doubt that the fuel shortage will be with us for a long time after hostilities cease, and, consequently, chemists will be hard put to it to find substitutes for petrol until such time as normal supplies are obtainable.

Dealing with the process of "cracking," which consists of subjecting oil to violent heating in the absence of air, Mr. Moore points out that Mr. W. A. Hall, in the *Journal of the Institute of Petroleum Technologists*, suggests, as a future source of petrol in Great Britain, the production of cracked spirit in specially constructed oil gas plants, to be worked in gasworks, and estimates that motor spirit could be produced as a by-product at a cost of 5d. per gallon.

Mr. Moore also deals with shale oil, coal tars, and their products, benzine, and benzole, the possibility of getting fuel from wood and peat, and from alcohol. Some of the figures given in the book are extremely interesting, and the work is certainly one which might be well studied to the advantage of a large number of users of internal combustion engines.

Repairing Motor Cyclist's Overalls.

Motor cyclists have long experienced the annoyance of torn overalls, and have long realised the impossibility of satisfactorily repairing these garments, whether they be made of macintosh, oilskin, or waterproofed cloth. The Leicester Rubber Co., Ltd., Post Office Place, Leicester, have now brought out a couple of repairing outfits, one suitable for khaki and waterproof materials, and the other a general outfit, which is intended for the repair of coats, overcoats, waistcoats, trousers, linings, oilskins, hoods, umbrellas, and kid gloves. Both these outfits are sold under the name of Mend-a-Tear.

To mend a tear in a garment it is better to repair from the inside. From a strip of material found in the outfit a patch large enough to cover the tear properly should be placed over the part to be repaired, coated side downwards. It should be then covered with a piece of paper and an ordinary hot flat iron should be applied to it. In repairing a lined garment the patch should be inserted through the tear, coated side upwards, and then treated with the iron after a piece of paper has been applied. To repair very thick material, roll a narrow strip of Mend-a-Tear adhesive to about the thickness of a pin, and insert this between the frayed edges of the tear in addition to the patch.

It is also possible to repair a garment with a piece of the same material, which, of course, is an undoubted advantage.

The outfits cost 1s. each.

(Left) A torn garment before treatment. (Right) The same garment half-an-hour later.

Review.

"The Aviator's Handbook," 1s. 6d., L. M. Waterhouse, M.I.E.E., M.I.A.E., A.M.I.C.E., and H. Arrault, A.F., Aero Institute, Engineer in Aeronautics. The Aeronautical Department, the Motor Training Institute, 10, Heddon Street, Regent Street, London, W.1.

In view of the interest taken by this journal in aviation, the booklet that we have under review will be of undoubted value to those of our readers who are following up the subject. It is exceedingly handy for them to have at their disposal a concise dictionary of flying terms to which they may refer, and so quickly master the subject which they have taken up. The English-French and French-English dictionary of aviation terms, one printed in red and the other in blue, will also be of great value. There is much in common between the aviator and the motorist, especially so far as the engine and also tool and shop terms are concerned.

British Magnetos.

"About British Magnetos"; published by the British Ignition Apparatus Association, 8, Breams Buildings, London, E.C.4. It is stated in this brochure, which contains an interesting history of the development of the British magneto, that the number of these instruments constructed in this country at the beginning of the war was quite small, owing to the fact that the Germans were first in the field, and had established a reputation for a well-made article. To compete against this reputation would have meant much hard work, and also the outlay of much money, and in spite of warnings published, chiefly by *The Autocar* and *The Motor Cycle*, manufacturers did not think it worth while to expend money or work in connection with the manufacture of an instrument which possibly might not prove a success. The war has altered this state of affairs, and there are at the present time nine firms engaged in the manufacture of magnetos, whose works are all illustrated in the centre of the booklet. The difficulties with which British magneto makers had to contend were great, and entailed much research work, the procuring of special materials, and also the task of learning the special processes necessary.

The nine firms in question are members of the Association, and much of the success gained is due largely to the opportunities afforded by the Association to its members for co-operation and interchange of ideas. The magnetos produced by these firms will be standardised; the complete magnets are to be made interchangeable with the best pre-war types, as well as with one another; most of the essential parts are to be standardised and made interchangeable; for example, screws will be of standard dimensions, different sizes of brushes are to be standardised and reduced in number, and therefore spare parts will be cheaper, more easily made, and quickly obtainable.

The book deals also with the work carried out by the Tanks, aeroplanes, airships, and motor patrol boats fitted with British-made instruments, and concludes with an illustrated list of the standardised types of British magnetos for the motor trade.

Water wont trouble you

If your bike is fitted with the ALL BRITISH

C.A.V. Magneto

BRITISH THROUGHOUT

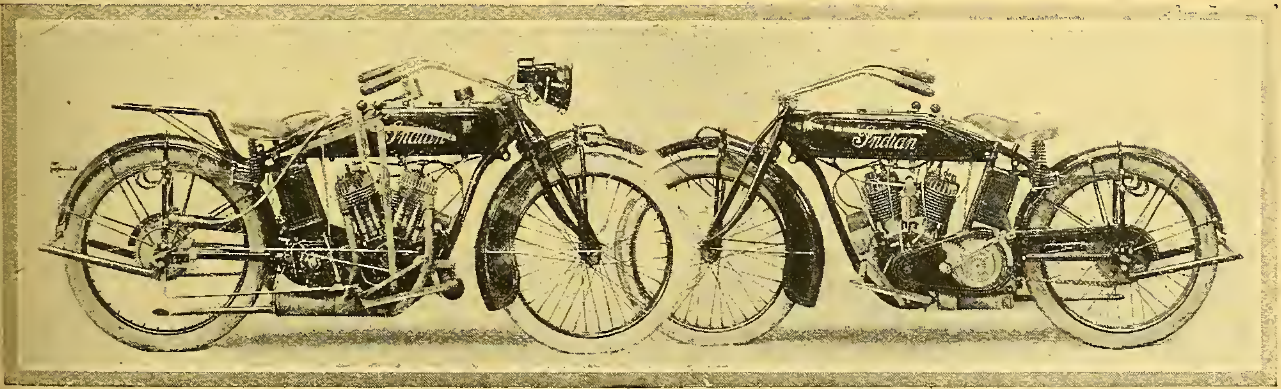
Totally enclosed and absolutely dust, water, weather and fool proof

• • • • •

Don't take risks but get our folder F and spare parts list

C. A. VANDERVELL & CO., LTD.
Electrical Engineers
ACTON, LONDON, W.3

1918 Powerplus Indian Motocycles



Which we trust will be Post-War Models.

We regret that we are not in a position to supply motorcycles at the present time, but we can send 1918 abridged descriptive lists on application. This applies to Great Britain only.

"Indian Motocycle"
Hendee Manufacturing Co.

HENDEE MANUFACTURING CO.,
"Indian House," 366-368, Euston Road, London, N.W
Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA, 109-113, Russell St., Melbourne.
CANADIAN WORKS, 12-14, Mercer St., Toronto.
AFRICA, Indian House, 127-9, Commissioner Street, Johannesburg.
Indian House, 579, West Street, Durban.
Indian House, Strand Street, Port Elizabeth.

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns—First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

1916 4h.p. A.J.S., 3-speed, solo mount; £56.—22, Gilmore Rd., Lewisham. [3993

1916 4h.p. A.J.S. Combination, spare wheel, perfect; £70.—86, High Rd., Lee. [3992

A.J.S. 6h.p. Latest Model in stock.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [X2778

A.J.S., latest 6h.p. models, service green; delivery from stock.—Parker's, Bradshawgate, Bolton. [X2859a

A.J.S., 2¾h.p., 2-speed, 1917, No. 5,852, carefully used, better than new; £47.—Newitt, Eaton Villa, Market Drayton. [4114

A.J.S., 1914, 2-speed, clutch, new B. and B. carburetter, chain drive; £20.—Miller, 3, Manor Rd., Bishops Stortford. [4043

2¾h.p. A.J.S., 1916, 2-speed, clutch, kick starter, enclosed drive, speedometer, perfect; £35.—Railway Garage, Staines. [4146

A.J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

A.J.S., 2¾h.p., 2-speed, kick starter, hand clutch, unused 3½ years, perfect throughout, smart, very fast, small mileage; £35/10.—Lord, Mountfield, Prestwich. [X2803

IF IN NEED OF A Motor Cycle or Combination

EITHER FOR
WAR WORK or
BUSINESS PURPOSES,
WRITE TO

GODFREY'S LTD.

They can supply you from stock, and you can rely on getting value for your money.

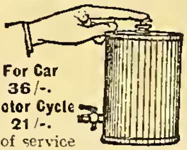
SEND FOR FULL LIST OF
NEW AND SECOND-HAND MACHINES.
EASY TERMS.

GODFREY'S LTD.
208, Gt. Portland Street,
LONDON, W.1.
'PHONE: 7091 MAYFAIR (2 Lines).

THOUSANDS RECOMMEND IT.

THE EUK EASY STARTER

Should be fitted now.

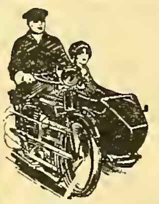


For Car 36/-.
Motor Cycle 21/-.

Keeps motors that are out of service ready for use. Only needs a touch, and it gives the most perfect easy starting instantly and always.

Write for full details.

ALEXANDER & CO., Dept. B, 115, Lothian Road, EDINBURGH; 274, Gt. Western Road, GLASGOW.



THE BETTER WAY.
Exchange it.
Send for our
PRICE LISTS OF MOTOR CYCLES,
post free.
THE NORTH WALES MOTOR EXCHANGE,
Chester St., Wrexham, N. Wales.

CLEAN ALUMINIUM, BRASS, and GUNMETAL
CASTINGS
For AIRCRAFT, MOTORS, and MOTOR CYCLES
SAMUEL F. ROGERS
(Metallurgical Chemists & Metalographists),
CALEDONIAN WORKS, PRINCE'S END, TIPTON.

IMPORTANT NOTICE.

Owing to the Easter Holidays, the issue of "The Motor Cycle" for April 4th, must be closed for press earlier than usual. All copy and instructions for Miscellaneous Advertisements in that issue must, therefore, be in our hands not later than first post on Thursday, March 28th.

MOTOR CYCLES FOR SALE.

A.J.S.

RIDER TROWARD and Co., 31, 40b, 78, High S Hampstead.—1916 De Luxe A.J.S. combinatio hood, screen, spare wheel; 89 gns. [408

A.J.S. Motor Cycle, 6h.p., twin-cyl., 3-speed, coac built sidecar, all equal to new; price £100, nearest offer.—Can be seen at 20, Oxford Mews, Tic field St., Edgware Rd., London. [40

A.J.S., 1914, 2 speeds, all chain drive, lamps, hor etc., tyres nearly new, all in splendid conditio petrol and oil, spares, etc.; £37/10 lot.—Colling Plumber, Duke Bar, Burnley, Lancashire. [40

1916 4h.p. A.J.S., No. 8,078, with luxurious coac built sidecar, spare wheel and tyre, hood, scree 3 lamp sets, mechanical horn, Cowey speedometer, s tools, perfect order throughout; £85.—Robinson's Ga age, Green St., Cambridge. [41

A.J.S. Motor Cycles.—Immediate delivery of Milita model, complete, detachable wheels, 700×80 tyre £91/6; trade supplied; no permits required.—P. Evans, sole agent for Birmingham and district, 87-9 John Bright St., Birmingham. [37

A.J.S., 6h.p., and sidecar, with wind screen, lamp, a horn; this is one of the latest 1915 models turn out, as it left the works in October, 1915. The out has been thoroughly overhauled and revarnished, a is practically equal to new in every possible respec price only 80 gns.—Julian, 84, Broad St., Readi Biggest light car and motor cycle dealer in the Sou 'Phone: 1024. Closed Wednesdays 1 o'clock. [07

A.J.S. Spares; prompt delivery. — Cyril Williar Chapel Ash Depot, Wolverhampton. [96

Alldays.

ALLON, 2¾h.p., single, £38, new; 2-speed, £45, ne 2-speed and hand clutch, £48, new; 2-spe £28/10; E.P., or exchange.—Service Co., 292, H Holborn, London. [X28

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-sp countershaft models in stock. [10

GENUINE Bargain.—Brand new Ariel combinati 3½h.p., only done few miles; £85, or nearest c offer.—Box 1,793, c/o *The Motor Cycle.* [X27

ARIEL 1914 5-6h.p. Twin, 3-speed, Senspray, ac mulator lighting, coachbuilt sidecar, perfect r ning order; £55; seen any time.—2, Beaconsfield I New Southgate, N.11. [40

ARIEL Combination, 3 speeds, clutch, lighting tools, equal new; £35; would separate; also Indi 7-9h.p., clutch, lighting set, tools, splendid order, £ —Box L5,796, c/o *The Motor Cycle.* [4

Auto-Wheels.

WALL Auto-Wheel, powerful engine, good conditi 7 gns. for quick sale. — Vincent, Cerne, Ab Dorchester. [4

Bat.

RIDER TROWARD and Co, 31, 40b, 78, High Hampstead.—1914 Bat-Jap, 6h.p., 3-speed, do sidecar; 42 gns. (D) [4

Bradbury.

BRADBURY, 1913, 3½h.p., 3-speed model; £29 —Motor Exchange, Horton St., Halifax [4

Brough.

BROUGH 1916 Model, 2-speed, including lamp; gns.; this machine is one of the greatest barg offered.—Julian, 84, Broad St., Reading. Biggest l car and motor cycle dealer in the South. 'Pho 1024. Closed Wednesdays 1 o'clock. [C

BROUGH, 1915, 3½h.p., 2-speed counters £42/15; 1916, 3-speed Sturmey-Archer cou shaft, kick starter, hand clutch, P. and H. head rear lamp, horn, Stewart speedometer, etc., £55 with Watsonian sidecar, £65/10; E.P., or exchan Service Co., 292, High Holborn, London. [X

B.S.A.

B.S.A. 1916 4¼h.p. Combination, in real nice c tion; £58.

B.S.A. 1915 4¼h.p. Combination, in nice order;

B.S.A., 1916, 4¼h.p. solo, as new; £44.—Percy Co., 357, Euston Rd., London [

MOTOR CYCLES FOR SALE.

B.S.A.

IDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1916 B.S.A., 4¼h.p., 3-speed, as new, ıs. (D) [4073

h.p. B.S.A., N.S.U. 2-speed, B. and B., Bosch, Whittle belt, overhauled and re-enamelled, will sidecar; £18.—L. Marriott, Clumber St., Sutton hfield [X2774

.A. Combination, 1914, 3½h.p., 2-speed, free engine, all accessories, splendid condition; seen any ; trial; price £42.—E. Harvey, 29, High St., Wan-, Essex. [4070

Calthorpe.

LTHORPE, 2¾h.p. J.A.P., 2-speed model, 1917 in new condition; 38 gns.—Dents, Stonegate, York [4019

LTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits red.—P. J. Evans, 91, John Bright St., Birming [3713

Chater-Jap.

13 4h.p. Chater-Jap, 2-speed, powerful; £16/10.—53, Brownhill Rd., Catford. [3996

Clyno.

YNO, 1913, 5-6h.p. twin, 2 speeds, countershaft chain drive, coachbuilt sidecar, in real good order ghout; £20.—Percy and Co., 337, Euston Rd on. [4161

DER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1915 Clyno De Luxe combination, screen, spare wheel, 69 gns.; 1915 Clyno, 2-, 2-speed, 23 gns. [4084

YNO Combination, 1913-1914, 6h.p., 3-speed, detachable wheels and spare complete, Binks 3-jet retter, Enk easy starter, Stewart speedometer etc., electric lights and large accumulator, ampie ge and petrol carriers, a few spares, all mechanical and tyres in perfect condition; must be sold; st offer gets it.—T., 28, Wonford Rd., Exeter [4169

Dalm.

E 1916 Dalm, 2-stroke, countershaft 2-speed gear, tyres and everything as new; sell £20, or exchange nd 4-stroke same value.—A. Tilbury, Barley Mow, Horsley, Surrey. [3980

Douglas.

5 2¾h.p. Douglas, 3 speed, perfect order; £46.—53, Brownhill Rd., Catford. [3990

UGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

p. Douglas, 1914 model; £25; 2-speed model.—Wauchope's, 9, Shoe Lane, London. [4123

DER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 T.T. Douglas, 2-speed; 29 D) [4098

UGLAS, 1913, 1914, 1915, and 1916 models in tock from £22.—Percy and Co., 337, Euston Rd., n. [4160

UGLAS, 1913, single speed, T.T.; great bargain, £15, or exchange 2-stroke.—Jennings, 246, Ongar Brentwood. [4142

UGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat Tel.: 50. [5855

UGLAS, 1911, engine overhauled by makers, tyres sound, excellent condition, new Dunlop belt; £14 L5,806, c/o *The Motor Cycle.* [4049

UGLAS, 1914, T.T., speedometer, lamp, mirror, as new; snip, £35, or near offer.—Lt. Hellett, , 8, St. Nicholas Rd., Brighton. [X2855

UGLAS Motor Cycles.—We can supply by return 918 models on receipt of permit.—Eli Clark, ouglas agent, 196, Cheltenham Rd., Bristol. [0923

UGLAS, 1913, 2-speed, Bosch mag., £32/10; Model V, practically new, issued late 1917, £55; or exchange.—Service Co., 292, High Holborn, [X2837

5 Douglas, 4h.p., 3 speeds and clutch, kick starter coachbuilt sidecar, all lamps and horn, in exually fine order; £60.—Earnshaw, Cloth Hall St., rsfield. [X2793

UGLAS, 2¾h.p., 1911, perfect condition, just overhauled, new rings, latest 1917 Amac, hot air, 1 H. lighting set, Lucas horn, Whittle belt, T.T. good tyres; £17/10.—Wren, 15, Wrotham Rd., n Town, N.W. [4068

UGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions per 1912 single speed Douglas, £15/10; 1913 2-speed ıs, £31/10; 1914 2-speed Douglas, £34/10; 1915, 0.—Motor Exchange, Horton St., Halifax. [4030

EST 2¾h.p. W. Douglas, brand new, with the new pattern hand-controlled clutch, the latest forks, and many other improvements, £54, plus also U. and V. models, 1916 specification, £50, 10%; absolutely new; immediate delivery against y permits for doctors, farmers, war and munitions rs.—How and where to apply, full particulars, Douglas Specialists, Robinson's Garage, Green St. idge. [4129

ELCE & Co

COMBINATIONS.

1917 **HARLEY-DAVIDSON** Combination, in new condition, lamps, horn	£115 0
1917 **HARLEY-DAVIDSON** and Sidecar, magneto model, lamps, horn, very good condition	£110 0
1916 **SUNBEAM** Combination, 8 h.p., M.A.G., lamps, horn, very good order	£105 0
1916 **HARLEY-DAVIDSON** Combination, electric model	£80 0
1916 **ENFIELD** Combination, 6 h.p. lamps, horn, hood, screen, speedometer, unscratched condition	£85 0
1914-15 **MATCHLESS** Combination, 8 h.p., M.A.G., lamps, horn, luggage grid, just been overhauled	£65 0
1916 **B.S.A.** and Millford Sidecar, 4¼ h.p.; chain-cum-belt, lamps, horn	£65 0
1914 **DOUGLAS** Combination, 3½ h.p., 2-speed, lamps, horn	£50 0

SOLO MACHINES.

1917 **ZENITH GRADUA,** 4-5 h.p., clutch, kick-starter, lamps, horn; indistinguishable from new	£70 0
1917 T.T. **ROVER,** 3½ h.p., Philipson pulley, lamps, horn, as new	£45 0
1916 T.T. **NORTON,** fully equipped	£45 0
1917 **NEW IMPERIAL-J.A.P.,** 2¼ h.p., 2-sp., T.T. bars; only ridden a few miles. Bargain	£30 0
1915 **ALLDAYS ALLON,** 2¾ h.p., single-speed, good condition	£15 0
1912 **DOUGLAS,** 2¾ h.p., lamps, horn, speedometer	£15 0

15-16, Bishopsgate Avenue,
—Camomile Street, E.C.3.—
'Grams: "Elcemocyca, London."
'Phone: Avenue 5548.

MOTOR CYCLES FOR SALE.

Enfield.

1916 Enfield, 3h.p., 2-speed twin, and light C.B. Watsonian sidecar, good condition, accessories; £45—3, Laurel Rd., Barnes, S.W. 13. [X2800

ENFIELD, 1914, 6h.p., 2-speed, coach combination in fine order, £62/10; 1915 model, £72/10; 1916 £82/10.—Motor Exchange, Horton St., Halifax. [4031

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3527

ENFIELD, 3h.p. M.A.G. engine, Bosch, 2 speeds, kick start, condition perfect; £25, or exchange.—85, Revelstoke Rd., Wimbledon Park, S.W. [4148

6h.p. 1914 Enfield Combination, coachbuilt sidecar complete with accessories; £55, genuine bargain; smart turnout.—Wauchope's, 9, Shoe Lane, London. [4120

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X2841

RIDER TROWARD and Co., 31, 40b, 78, High St. Hampstead.—1917 Enfield standard combination, hood, screen, 77 gns.; 1916 standard Enfield combination, 72 gns.; 1917 3h.p. twin Enfield, as new, 44 gns.; 1915 3h.p. twin Enfield, 32 gns. (D) [4076

ROYAL Enfield Combination, 1914, 2-speed, mileage 5,400, new heavy Dunlops, 1917 automatic Pilot, chain drive, gas lamp set, Cowey speedometer, luggage grid, toolbox, fitted handle start, wind screen, full kit of tools and spares, perfect condition; any trial; 49 gns., or near; 70 m.p.g.—128, Camberwell Grove, S.E. [4118

Excelsior.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1917 American Excelsior, 7-9h.p., 3-speed, coach sidecar, dynamo lighting, absolutely as new; 39 gns. (D) [4082

F.N.

F.N., 4-cyl., Bosch, Palmers, no carburetter, good condition; must sell, £10.—R., 95, Park St., N.W.1. [X2777

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—Latest model F.N., 7-9h.p., 3-speed gear box, coach sidecar; 72 gns. (D) [4085

F.N., 2½h.p., 2-speed, F.E., shaft drive, Bosch, good order; bargain, £15, or exchange and cash solo or 2-stroke.—13, Cornwall Mews, Gloucester Rd., S.W.7 [4056

Grandex.

GRANDEX Precision, 4h.p. twin, Enfield 2-speed, hand starter, late model; 20 gns.; appointment.—W. Norman, 100, Acre Lane, Brixton, S.W. [4065

MOTOR CYCLES FOR SALE.

Harley-Davidson.

HARLEY-DAVIDSON 7-9h.p. Combination, electric lights, nearly new condition; bargain.—Andrews, Settle. [X2299

1915 Harley Combination, electric model, good condition, new tyres, hood and screen; what offers?—N. Lee, 11, Bancroft Rd., Mile End, London, E. [4001

HARLEY-DAVIDSON, latest khaki model, fitted with special Harley Montgomery sidecar, brand new; delivery from stock; £135.—Parker's, Bradshawgate, Bolton. [X2858

HARLEY-DAVIDSON, 7-9h.p., late 1914, petrol and paraffin, Mills-Fulford sidecar, excellent condition; £60, bargain.—Sharpe, Gladwyne, Rushby Mead, Letchworth. [X2770

HARLEY-DAVIDSON Combination, 1916, done 2,500, electric fitted model, Watford speedometer, tools; seen any time; £75.—Park View, 6, Abbey Rd., Bush Hill Park, Enfield. [4013

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1915 Harley-Davidson, dynamo lighting combination, 65 gns.; T.T. Harley, 7-9h.p., 3-speed, disc wheels, clutch, kick start, dynamo lighting, olive green finish, 65 gns. (D) [4086

Hazlewood.

6h.p. Twin Hazlewood, fitted with handsome coachbuilt sidecar, 3-speed countershaft gear, fitted with all accessories; bargain at £47/10.—Wauchope's, 9, Shoe Lane, London. [4124

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X2839

Henderson.

1915 Henderson Combination, car on 2 wheels; £62.—86, High Rd., Lee. [3995

1916 Henderson and Millford Empress sidecar, in topping condition; £65.—16, York St., Dover. [4171

Humber.

HUMBER, 3½h.p., 2 speeds, almost new tyres, in real good order and condition throughout; £12.—Percy and Co., 337, Euston Rd., London. [4153

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1918 Humber, water-cooled, 6h.p. flat twin, 3-speed, Cooper sidecar; 97 gns. (D) [4074

HUMBER, 3½h.p., suitable sidecar or solo, smart, up-to-date, recently had £10 overhaul, practically as new, 2-speed, free, and handle starting; £18, worth double.—Box L5,976, c/o *The Motor Cycle.* [3986

Indian.

INDIAN 1916 Powerplus Combination, practically new, fully equipped; £65.

INDIAN, 1915, 5h.p., 3 speeds, as new, run 500 miles; only £50.—Percy and Co., 337, Euston Rd., London. [4154

INDIAN, 7-9h.p., free engine, twin; £23/10.—Motor Exchange, Horton St., Halifax. [4032

INDIAN, 5-6h.p., 1915, 3 speeds, clutch, lamps, and horn, ridden 1,000 miles, perfect condition, good tyres; £40, or nearest offer.—Box L5,805, c/o *The Motor Cycle.* [4028

1914 7-9h.p. Indian and Gloria sidecar, 2-speed, clutch, 3 electric lamps, electric horn, speedometer, spare cover and tubes, just been overhauled by Hendee Co., and 1916 kick start fitted; nearest offer to £60.—Owner, 4, Sherard Gardens, Wellhall, S.E.9. [X2754

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1916 Powerplus Indian, 3-speed, clutch, kick start, 59 gns.; 1916 T.T. 7-9h.p. clutch model Indian, 42 gns.; 1915 7-9h.p. 3-speed Indian combination, disc wheels, 57 gns.; 1915 T.T. clutch Indian, 37 gns.; 1914 T.T. clutch Indian, 29 gns. (D) [4075

Ixion.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1917 Ixion, 2-speed, 2-stroke, mileage 300; 27 gns. (D) [4089

James.

JAMES, all new models; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X2834

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1916 James, 2-stroke, 2-speed; 25 gns. (D) [4090

J.A.P.

1917 8h.p. J.A.P. Sunbeam Combination (War Office Model), No. 2 sidecar, wind screen, luggage grid, storm apron, lamps, horn, spare wheel (unused), etc., not done 1,000 miles; this is a lovely outfit, in excellent condition; £115; trial by appointment; no offers.—Walker, 54, Linaker St., Southport. [X2569

Kerry.

3½h.p. Kerry Cycle, with gear, £6; sidecar, £2; or exchange.—50, Ballspond Rd., Islington, London. [4130

Lea-Francis.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1915 Lea-Francis, 3½h.p. twin J.A.P., 2-speed; 48 gns. (D) [4079

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Levis

LEVIS. 1915 and 1916 models in stock from £15.—Percy and Co., 337, Euston Rd., London. [4168

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1916 Levis Popular, as new; 21 gns. (D) [4093

2¼h.p. 1915 Popular Levis, sound mechanical condition, new piston, heavy Dunlops; £22, offers.—M.C., Rose Cottage, Hintlesham, Suffolk. [3977

Lincoln-Elk

LINCOLN-ELK, 1914, 6h.p., countershaft gear, belt and chain drive, underslung coach sidecar; £45.—Motor Exchange, Horton St., Halifax. [4033

Matchless.

1915 7h.p. M.A.G.-Matchless Combination, dynamo lighting; £80.—86, High Rd., Lee. [3994

£5.—Matchless-Jap. 2¾h.p., no magneto.—Aero, 73a, Cumberland St., Edinburgh. [4112

1913 8h.p. Matchless Combination, 2-speed, kick start; £27 10.—29, St. Leonard's St., Bow. [4117

MATCHLESS Latest Model 8h.p. Model Combinations, spare wheel complete; delivery from stock; £120.—Parker's, Bradshawgate, Bolton. [X2859

MATCHLESS Latest War Model Combination, complete with detachable wheels, spare wheel and tyre; £120.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3523

7h.p. Matchless Sidecar Outfit, complete with all accessories, M.A.G. engine; offers wanted; inspection at any time.—Grose, Ltd., Marefair, Northampton. [X1641

MATCHLESS 8h.p. Combination, new, fitted with J.A.P. or M.A.G. engines; extended payments or exchanges.—Service Co., 292, High Holborn, London, W.C.1. [X2835

MATCHLESS Late 1914 8h.p. Combination, all accessories, splendid condition, just overhauled, not used for 12 months; owner at Front; £75.—Tucker Bros., 136, High St., Watford. [X2760

MATCHLESS Motor Cycle, 3½h.p. Premier, fixed engine, Bosch mag., B. and B. carburetter, Miller front lamp, and Brooks saddle; £18, or nearest offer.—Chapman, 5, Albatross Rd., Plumstead. [X2720

7h.p. Matchless M.A.G. 6B. Combination, with Swan sidecar, hood and screen, £55; another, with Matchless sidecar, hood and screen, £65; brand new 8B2 combination, M.A.G. engine, spare wheel and tyre, £125.—1a, Bloomfield Rd., Plumstead. [X2783

MATCHLESS 1917 8B2 Combination, run 450 miles, condition as new, and mechanically perfect, fitted wind screen, leg guards, footboards, despatch box, tool cases, 2 Lucas 462 head lights, generators complete, tail light and generator, Enk easy starter, watch, Cowey trip speedometer, mirror, Lucas horn, spare wheel and tyre, petrol carrier and can; cost £160 last September, will accept £135; seen by appointment.—A.T., 9, Shirley Rd., Wallington. [X2742

New Hudson.

NEW Hudson, 1913 pattern, 2½h.p., lightweight, easy running machine; £20.—Box L5,804, c/o *The Motor Cycle*. [4024

NEW Hudson, 1914, 4h.p., 3 speeds, coachbuilt sidecar, in first-class condition; £34.—Percy and Co., 337, Euston Rd., London. [4167

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1915 New Hudson Big Six combination, 52 gns.; 1916 New Hudson, 2-speed, 2-stroke, 25 gns. (D) [4092

3½h.p. New Hudson (1914), Armstrong 3-speed, clutch, new gears, bushes, rings, and valves, re-enamelled green, everything perfect; £20, lowest.—Becks, 21, Victoria St., Norwich. [X2784

New Imperial.

CROW Bros., Guildford.—New Imperial, latest 2½h.p., 3½h.p., 6h.p. models in stock; also sound second-hands [1047

NEW Imperial-Jap, 8h.p., 3-speed War Model combination; 109 gns.; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3521

NEW Imperial-Jap, 2¾h.p., 1916, 2 speeds, lamps, horn, etc.; £24, or nearest offer; must be cleared, owner joining up.—Lethermans, Croft, Dunmow, Essex. (D) [4010

NEW Imperial Motor Cycles, 2 speeds, clutch and kick starter, and lady's models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [3714

Norton.

NORTON 1918 Military Model, brand new, in stock.

NORTON 1916 Big 4 Combination, practically as new; £65.

NORTON, 1917, T.T., indistinguishable from new; £55.—Percy and Co., 337, Euston Rd., London. [4155

NORTON Big 4, all-chain drive Military Model; £82.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3524

NORTON Latest Military Model, Big 4, all chain; immediate delivery; £82.—Parker's, Bradshawgate, Bolton. [X2860

We hope to offer a Special Bargain each week this year

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MOTOR CYCLES FOR SALE.

Norton.

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1918 Military Model Norton, new; £82. (D) [4078

NORTON.—Big 4 Military Model, all-chain, new; also chain-cum-belt, £57 10; E.P., or exchange.—Service Co., 292, High Holborn, London. [X2847

3½h.p. Brooklands Special T.T. Norton, winner of Public Schools' hill-climb; owner at sea; £45.—W. P. Cubitt, H.M.S. New Zealand, c/o G.P.O. [X2828

N.S.U.

N.S.U., 2¾h.p., just overhauled, Bosch speedometer, splendid running; about £17.—F.W., 50, Guilford Av., Surbiton. [3988

HAVING Acquired the entire stock-in-trade of the N.S.U. Motor Co., Ltd., we can supply spares for practically all types of N.S.U. motor cycles. In ordering it is important to submit old parts as patterns.—Eagles and Co., Acton Hill Works, Acton, W.3. [0739

N.U.T.

3½-4h.p. N.U.T., twin-cyl., belt drive, 3 speeds, 2 brakes, kick starter, Lucas head lamps, knee-grips, horn, all accessories; a bargain, £55, lowest, in new condition.—Miller, 62, Hampstead Rd., N.W.1. [3927

Premier.

PREMIER, 3½h.p., Gradua gear, in splendid order, take sidecar anywhere; £15.—16, York St., Dover. [4172

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1916 military model Premier, 3½h.p., 3-speed; 42 gns. (D) [4095

PREMIER, 1914, 3½h.p., 3-speed, P. and H. lamp, horn, Stewart speedometer, etc., £23/10; 1916 3½h.p., 3-speed countershaft and kick starter, coach built sidecar, large P. and H. lamp, horn, £61/15; E.P or exchange.—Service Co., 292, High Holborn, London. [X2846

Quadrant.

QUADRANT Combination, 1915-16, 4¼h.p., B.S.A. 3-speed gear box, chain drive, specially sprung coachbuilt sidecar, mileage 1,000, condition as new; £52, lowest.—Graves, Harlington, Middlesex. [3987

Radco.

RADCO, 1915, 2-speed, 2-stroke, 2¼h.p., good appearance; £21/10.—Motor Exchange, Horton St., Halifax. [4034

Rex.

REX, 3½h.p., battery, £7, or exchange 8h.p. w.c. single engine, cycle car parts.—40, Clarendon Rd., E.17. [4005

MOTOR CYCLES FOR SALE.

Rex.

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—1914-Rex 6h.p. coach com tion: 38 gns. (D)

1912 Rex, 6h.p., 2-speed gear, cane sidecar, in condition throughout; £28/10.—J. Plastow, Osborne St., Grimsby. [X

REX, 1913, 6h.p., 2-speed, sidecar, just overha suit tradesman; bargain.—Rogerson, 9, H Hall Rd., Newcastle-on-Tyne. [X

REX de Luxe 1914 3½h.p. Combination, Bosch tight mag., B. and B. carburetter, tyres mechanically perfect; £20, or offer.—93, Fentiman London, S.W.

REX, 3½h.p., Binks 1916 3-jet carburetter, mag., lamps, horn, new John Bull belt, new shall back tyre, good condition; bargain, £15, or —Box 1,787, c/o *The Motor Cycle*. [X

Riley.

4h.p. Riley Cycle, B. and B., engine good, ac lator, £5; wanted, N.S.U. gear.—2, Ann Te Brechin. [X

Rover.

ROVER, 3h.p., clutch, 3-speed, new back cover gain, £12.—17, Cobourg Rd., Bristol. [X

1917 3½h.p. Rover, little used, one owner only new; £70.—J. Fryer, Ltd., Hereford. [X

ROVER.—All new models supplied; E.P. or exch —Service Co., 292, High Holborn, London. [X

ROVER, 1913, free engine clutch, Bosch, new lops and tubes; owner joining up; offers 1,790, c/o *The Motor Cycle*. [X

3½h.p. T.T. Rover, late 1917, used 6 weeks, met fatal accident whilst flying, perfect tion; £55.—Mrs. A. D. Stewart, The Heath, Peter Hants.

ROVER, 3½h.p., 1917, with sidecar, new in Se ber, only ridden twice; cost £100; want price £60; seen any time.—Owner, 83, Carleton Tufnell Park N.7.

3½h.p. New Rover Combination, fitted with g Rover sidecar, includes all accessories; £84, guaranteed brand new.—Seen at Wauchop Shoe Lane, London.

ROVER Motor Cycles, 3½h.p. and 5-6h.p. mod stock for immediate delivery, both solo and car outfits; trade supplied; no permits requir J. Evans, 91, John Bright St., Birmingham.

1917 Rover, T.T., Philipson; this machine is tinguishable from new—in fact, it is in condition than a new machine, only done 500 price 50 gns.—Julian, 84, Broad St., Reading. light car and motor cycle dealer in the South 1024. Closed Wednesdays 1 o'clock.

Royal Ruby.

ROYAL Ruby.—All new models supplied; E exchange.—Service Co., 292, High Holborn,

Rudge.

RUDGE Multi, 3½h.p., absolutely tip-top; £23 for particulars.—Box L5,801, c/o *The Motor*

BARGAIN.—1915-16 Rudge Multi, 3½h.p., Rover sidecar, all lamps, tools, perfect con test invited; nearest £36.—102, Perry Hill, C S.E.6.

RIDER TROWARD and Co., 31, 40b, 78, Hi Hampstead.—1915 Rudge, 5-6h.p., 3-speed, sidecar, 48 gns.; 1916 Rudge Multi, 3½h.p., co combination, 44 gns. (D)

1915 Rudge Multi, fitted with 650×65 Dunlop tyres, P. and H. head lamp and generator tools, etc., in excellent order, only used 2 m The North Finchley Motor Co., Woodhouse North Finchley.

Scott.

SCOTT, in perfect order, with Lucas accessor Stewart speedometer, recent model; £48, or offer.—Dents, Stonegate, York.

Singer.

SINGER, 4h.p., free engine model, Bosch, B., good condition; £20, or exchange ligh —85, Revelstoke Rd., Wimbledon Park, S.W.

Sun.

1915 Sun-Villiers, new condition, perfect, 2 years; £14/10, no offers.—69, Kingst New Malden.

SUN-VILLIERS, 2½h.p., 2-speed countersha £37/16; V.T.S., single speed, new, £30/1 2½h.p., 2-speed, £28/10; E.P. or exchange.—Ser 292, High Holborn, London.

Sunbeam.

1917 3½h.p. Sunbeam Combination, Lucas la horn, perfect condition; £80.—Skiner, Na Leicester.

RIDER TROWARD and Co., 31, 40b, 78, Hampstead.—1916 Sunbeam, 3½h.p., 3-sp fect; 65 gns. (D)

SUNBEAM 1917 3½h.p. Combination, run 6 fully equipped, indistinguishable from ne —Percy and Co., 337, Euston Rd., London.

March 28th, 1918.

THE MOTOR CYCLE
ESTABLISHED IN 1903
A posse ad esse
AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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Joint Research and the Motor Cycle.

II.—How it should be Financed and Conducted.

It may be asked why this particular moment is chosen as an appropriate one in which to raise this question of research and to devise schemes for co-operation in this matter. The answer is simple. We have got to solve the problem of keeping our industries in the forefront after the war. Diversion to war work has handicapped them seriously, and everything must be done to make up lost ground. The Government, recognising the position and the importance of research work as a means of accelerating improvement in design and construction, has created a fund to assist those industries that are willing to help themselves. This fund of £1,000,000 is to be dispensed by the Department of Scientific and Industrial Research during a period of five years. The Department has decided to spend it by subscribing annually to Research Associations which are constituted and regularly supported by their industries. Up to a fairly substantial sum, the Government will put up pound for pound.

It is important to note that this will only be done if the manufacturers' share is made up of regular subscriptions guaranteed for a period of from three to five years. It is felt that the value of research cannot be proved in a few months. Thus if Government support is wanted, it is no good for manufacturers to put up a trifling sum by means of subscription and then to add to it by donations to go to specified researches.

If £2,000 a year were regarded as a reasonable total, and if fifty firms supported the movement, then the average subscription would be £40 a year. This average might be obtained by a sliding scale of subscriptions, under which the biggest firms would pay, perhaps, £100 and the smallest, say, £20 or only £10. These amounts are not in themselves excessive, if the results are likely to be of any great value, but arrangements have been made which improve still further the generous offer that the Government has made. The manufacturers' subscription to a Research Association is regarded as expenditure out of income, before the assessment of income for any kind of taxation. Consequently, with income tax at 5s. in the £, a quarter of the manufacturer's subscription really comes from the Government, inasmuch as it is lost to the Income Tax Commissioners, and threequarters of the subscription is the out-of-pocket expenditure by the manufacturer. Thus a large firm would be expending, out-of-pocket, about £75 a year, possibly 80% of which might otherwise go, as excess profits, to the Government.

From this it will be seen that it is possible now for the industry to start important research on quite a substantial scale and yet at very moderate cost. If the Government is so confident as this in the value of the results to be obtained, surely the industry need have no hesitation in doing its share.

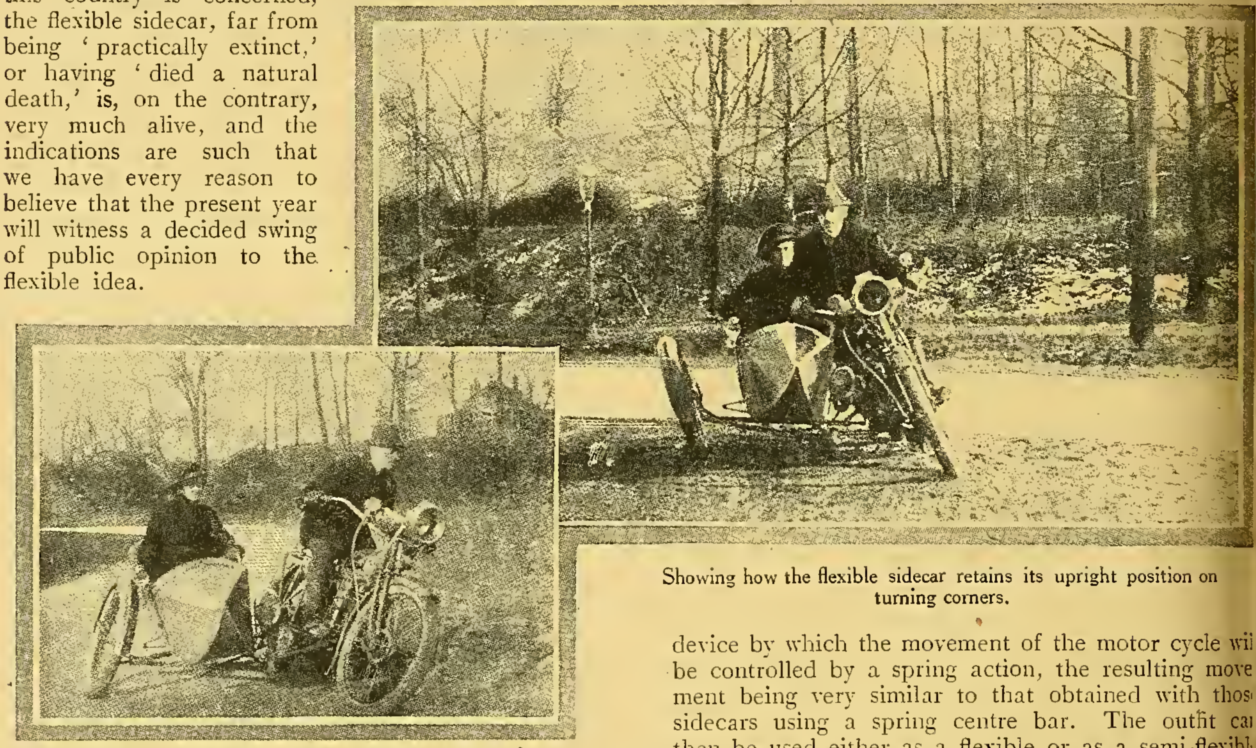
The Government contribution, of course, will be contingent upon the constitution of the proposed research association being satisfactory. The main point on which the Research Department would probably insist would be that the Association should employ a well qualified official as Director of Research. The Director of Research would examine the various proposals put forward by members of the industry, and would advise the Association as to the shaping of its programme, and would supervise all the work put in hand. The Department of Research might also want some small representation on the Board or Council of the Association. The control of the business would always be left in the hands of the industry, and the Government would not interfere with, or dictate to, the manufacturer. The whole proposition is an extraordinarily generous one, and those industries which do not act promptly may find the official funds so far pledged as to reduce very materially the support that can be offered to them.

THE FLEXIBLE SIDECAR IN AMERICA.

Remarks on a New Pattern Sidecar Chassis and on Flexible Sidecars in General.

"ON page 62 of the January 17th issue of *The Motor Cycle* there appeared, under the caption 'The Development of the Passenger Motor Cycle,' a statement to the effect that the flexible sidecar was no more.

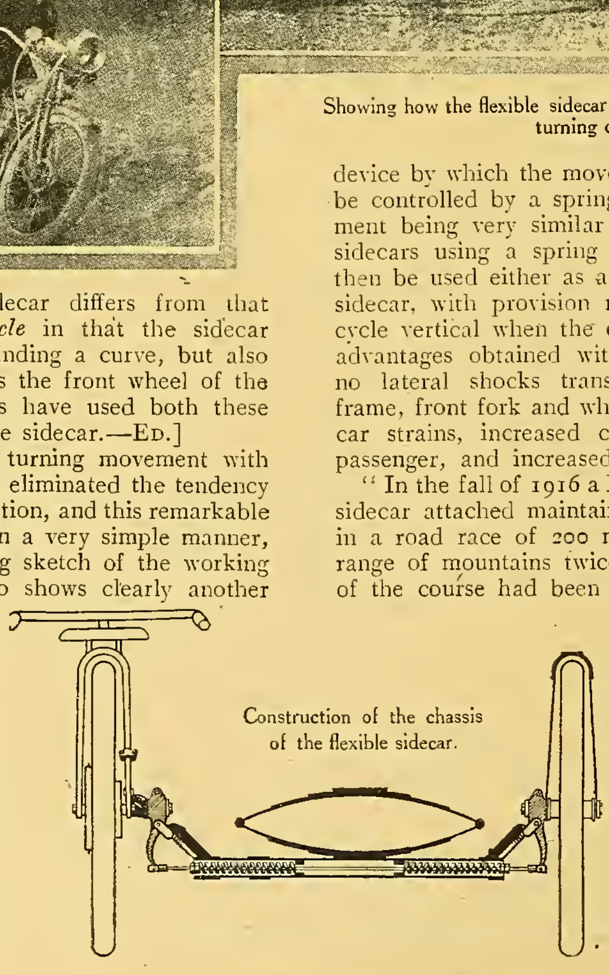
"It may interest readers to know that in so far as this country is concerned, the flexible sidecar, far from being 'practically extinct,' or having 'died a natural death,' is, on the contrary, very much alive, and the indications are such that we have every reason to believe that the present year will witness a decided swing of public opinion to the flexible idea.



Showing how the flexible sidecar retains its upright position on turning corners.

"The present flexible sidecar differs from that described in *The Motor Cycle* in that the sidecar wheel not only tilts when rounding a curve, but also *turns* in the same direction as the front wheel of the motor cycle. [British makers have used both these principles, but not in the same sidecar.—Ed.]

"The combination of the turning movement with that of the tilt has practically eliminated the tendency to side-slip upon every provocation, and this remarkable movement has been secured in a very simple manner, as shown in the accompanying sketch of the working mechanism. The sketch also shows clearly another great improvement over the earliest types of flexible sidecar, that of the adjustable spiral springs housed in the rear frame member, by which the complete outfit can not only be kept in perfect balance, but the side pull or drag on the motor cycle can be perfectly compensated.

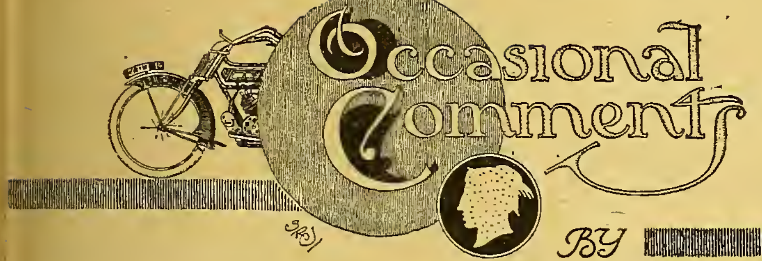


Construction of the chassis of the flexible sidecar.

"The other disadvantage mentioned—that of holding the machine upright when stationary—was overcome by fitting a combination rigid attachment to the sidecar. This was devised solely for the purpose of holding the motor cycle vertically while at rest. It was very easily operated, a touch of the foot or hand throwing on an eccentric lever. An improvement is now being effected in the latter device by which the movement of the motor cycle wi be controlled by a spring action, the resulting movement being very similar to that obtained with thos sidecars using a spring centre bar. The outfit ca then be used either as a flexible or as a semi-flexibl sidecar, with provision made for holding the moto cycle vertical when the outfit is at rest. Among th advantages obtained with this type of sidecar are no lateral shocks transmitted to the motor cycl frame, front fork and wheel are relieved from all sidecar strains, increased comfort for both driver an passenger, and increased m.p.g. and tyre mileage.

"In the fall of 1916 a Powerplus Indian with flexibl sidecar attached maintained an average of 42 m.p.h in a road race of 200 miles, crossing the Alleghen range of mountains twice. Before twenty-five mile of the course had been covered the other competin machine broke the frame o the motor cycle, and afte changing the motor an sidecar to another fram continued on, only to brea the sidecar frame sevent miles further on.

"As will be seen fro the illustrations, the chass is of simple, straight tul design, and all parts are designed that they can used in making up eith right or left hand cars."



Occasional Comment

BY IXION

Oil Consumption.

OUR valued contributor "Engro" takes me to task for supposing that the average oil consumption of a motor bicycle engine is as high as 400 m.p.g. I originally stated that I made this estimate with considerable qualms, but the simple fact is that no standard figure can be given. I myself am a born "scrapper." I learnt bad habits in reporting the early motor cycle trials, when the whole burden of a full report possibly rested on my shoulders, the competitors were travelling at 20 m.p.h., and I had to watch them climb all the important hills, and then catch them up again over bad roads. Under the high average speed thus necessitated, our small big-end bearings heated up in a short time, and had to be oil-cooled. I confess that I habitually ride at speeds which would seize up the big-end, and possibly the piston also, unless I utilised "oil-cooling." Then a comparatively sedate member of the staff tells us that he has owned more than one machine which seldom covered 100 miles without calling for the replenishment of his oil tank; in his case leakages through inferior crank case joints and poorly designed tappet guides were responsible. *Per contra*, I think I remember that Reg. Holloway once rode a 3½ h.p. Premier from Coventry to Town on a single pumpful of oil.

A Suggested Standard.

"ENGRO" makes the interesting suggestion that the simple formula $\frac{\text{Petrol consumption}}{16}$ indicates an average oil consumption, basing the standard on the proportion of petrol to oil recommended by manufacturers for petroil two-strokes. Personally, I consider that a standard can hardly be laid down. Let me give some reasons. In the first place, much of the oil is not "consumed" at all, in the mechanical sense, its consumption being merely economic, as it is ejected through stupidly designed tappet guides and badly fitted crank case joints: a machine of similar h.p. by another firm may hardly waste a drop. Secondly, with machines having plain bearings, the oil consumption increases extraordinarily in proportion to the average speed, as the bearings are too small for efficiency, and get overheated, unless you keep them drenched with cold oil. But this does not apply to ball and roller bearings, which would run well in a dry state, and are lubricated partly for waterproofing purposes. In the case of an engine fitted with ball or roller bearings, the oil supply is conditioned very largely by the needs of the piston. This brings us to a third variable factor. Some cylinders are excellently designed from a cooling standpoint, whilst others are rotten; cylinder cooling (or its absence) affects piston cooling in turn. One engine has a light, badly-cooled piston, which distorts unless it works in a bath of oil. Another has a piston which does not distort at all. The owner of the flexible piston habitually over oils, just because he knows that plenty of oil makes a good compression seal and prevents konks: the man who has a stiff piston can keep his compression and avoid pre-ignition without sloshing pints of oil through his engine in each hundred miles.

A Case in Point.

IN a certain big trial one or two riders achieved miracles with small engines pulling loads which seemed ridiculous. In one or two cases the riders injected several four-ounce pumpfuls of oil on test hills, to cool their pistons and big-ends, draining the hot oil out at the summit. A novice might learn to use similar tactics—indeed, many do—but would probably omit to drain out the surplus oil at the top of the hill. Heavy carbon crusts then form: carbon interferes with the radiation of heat, and over-oiling is necessitated in the interests of the piston and the big-end bearings.

The Kind of Engine Required.

I HAVE indicated that motor cycle lubrication strikes me as being a sea of chaos. Here is an outline of an engine which should prove economical. Its cylinder should be designed to eliminate distortion—*i.e.*, follow aero lines, into which I dare not enter closely. Its piston will be of aluminium alloy, cooling rapidly, and absorbing most of its own heat expansion by means of a slotted skirt or Ricardo type gaps between the two pressure panels. The main bearings might be of the ball type. The big-end bearings could follow the A.B.C. patent, the big-ends threading over the crank pins, after which rollers are inserted, and retained by half collars bolted into place. The oil reserve would be carried in a sump, and would cool down after circulation through the engine. Such a design includes every factor requisite to oil economy, and first-class workmanship will prevent external leakage at crank case joints and tappet guides. Except for the last item, none of the factors are present in the average motor cycle engine: and therefore it is only natural that in ordinary hands a motor cycle's oil consumption is astonishingly high. My own A.B.C. engine does not embody by any means all of the above points, seeing that it is now four years out of date: but it cannot be made to konk, and it can be run forty miles without the addition of a drop of oil.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

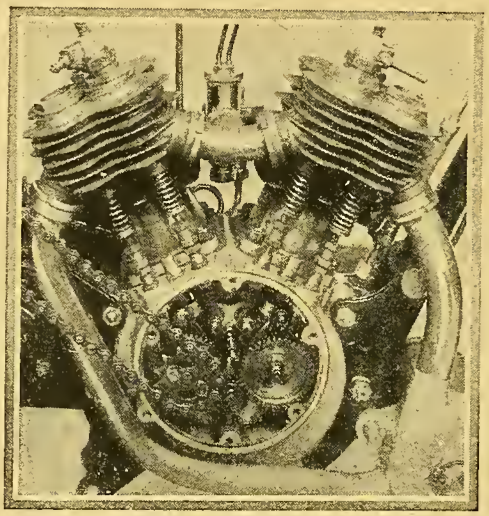
ILIFFE & SONS LTD.

The Case for the Long Stroke

Some Practical Comments on an Interesting Topic by an Experienced Long Stroke Enthusiast.

A COMPARISON of the two engines, long and short stroke singles, shows little structural difference externally, if examples by leading exponents are chosen. Internally the principal difference is, of course, the long stroke engine's narrow cylinder bore and light reciprocating parts. The short stroke theorists inform us that the reciprocating parts of their pet engine can be made almost as light as the corresponding parts of the long stroke engine of similar capacity. In practice, I have never found anything approaching this state of affairs.

TYPES OF MODERN LONG-STROKE ENGINES.



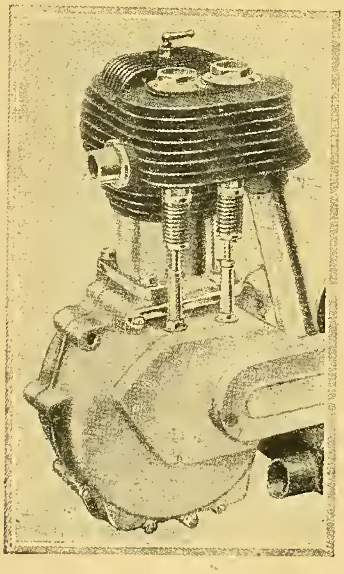
James 3½ h.p., 64 × 77 mm.

Now let us consider the various attributes that we consider desirable in our machines. First, I should place—

Easy Starting.—Personally, I always feel that the longer "induction effort" of the long stroke engine results in a very easy start.

In practice, I have always found this engine the easiest to start next to the horizontal twin. "Gumming up" in cold weather—that bugbear of the average single—I have yet to experience in a long stroke engine. Whether this is wholly due to good design or to the difference in areas of cylinder contact of the two pistons and rings, or a combination of both, I am not certain; anyway, I have never yet required to inject petrol to free any of my long stroke engines winter or summer, even after my machine has stood all night in the keenest frost.

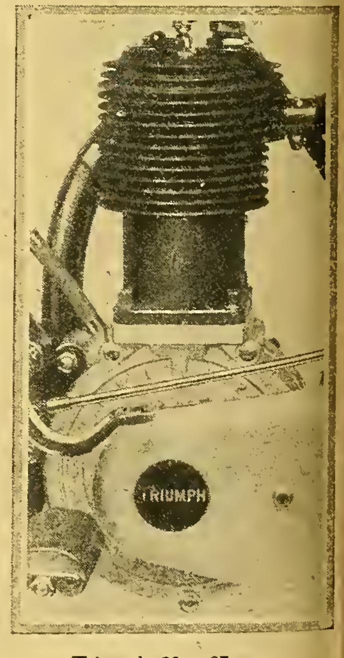
My personal experience of the average "square" engine in this respect has been that injections of petrol for piston firing purposes are generally necessary after a cold night's stand, even without the excuse of a low temperature.



Norton "Big 4," 82 × 120 mm.

Cool Running.—Here again, in practice the long stroke engine scores decisively, and will continue to do so until the theoretical day dawns when our cylinders and pistons are made of non-heat-conducting material. The longer piston travel and relatively slower revolution rate all tend to a better heat dissipation. As a natural corollary to this feature one would expect the power maintenance of the long stroke engine under load on the road to be superior to the short stroke engine of similar capacity. In practice, I have yet to find the short stroke single that will come anywhere near the long stroke engine of similar capacity in cool running and power maintenance under conditions of severe road work. Therefore, for sustained effort, I plump for the long stroke every time. Its average running temperature is lower than that of the equal capacity of square engine, therefore it does not spoil its cylinder lubricating oil to anything like the same extent as does the short stroke. As a result, carbonisation is appreciably reduced. The evidence on this point produced some time ago in our Correspondence pages is most certainly pretty conclusive.

Economy of Fuel and Oil.—Our next most desirable attribute arises directly from the previous heading, I think. A comparison of the two engines is interesting. The square engine over any average run is running at a higher rate of revolutions, and it is running at a higher temperature. By comparison with the relatively slowly turning and cooler running long stroke engine the square engine has a poor



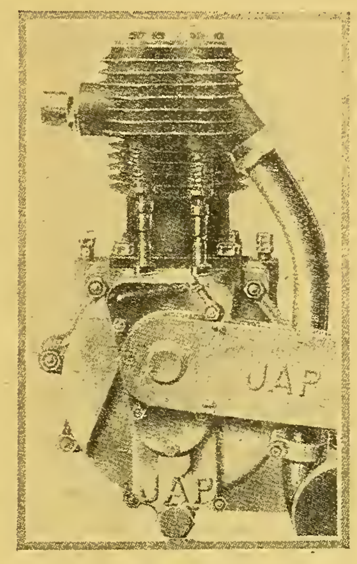
Triumph, 85 × 97 mm.

he Case for the Long Stroke.—

hance of winning the economy stakes for fuel and il consumption.

On benzole the economical running of the long troke engine is simply wonderful, as this engine is ble to utilise to the full the slower rate of flame proagation of this fuel. The driving ffort of a long stroke engine on good enzole must be nearly akin to the lastic push of a steam engine.

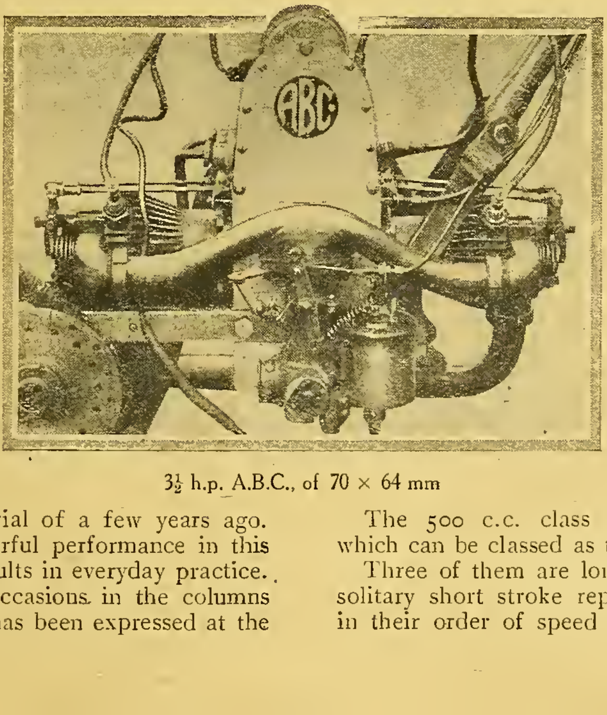
TYPES OF MODERN SHORT-STROKE ENGINES



4 h.p. J.A.P., 85½ × 85 mm

Speed and Power.—I think the short *ésumé* of long stroke engine performnces that I intend to present will ubstantiate my claim that, in this espect at least, nobody can doubt the nique position the long stroke engine ccupies in the motor cycling and car vorld. As an amateur in engineering natters, I have always thought that the ngine which utilised the expansile ush of the burning mixture to the ullest possible extent would be the ngine for power development, without vhich there can be no speed. In ractice it appears to work out so in n unmistakable manner.

Engine Wear.—This question arises rom the subject of bearing pressure, nd the theorists of both sides have old us all about it. Personally I will ack my long stroke engine bearings to e in better condition at 10,000 miles han the bearings of any "square" ingle that has done the same amount of work. At ,500 miles the bearings of a 1915 guaranteed speed nodel long stroke engine of mine were absolutely levoid of shake: so markedly so that the engineer vho took over the machine would not credit its milege—a mileage of genuine hard work, including 350 niles of single-geared sidecar work. In my opinion, he smaller bearing load the slower, cooler running and in consequence better ubrication efficiency), and he better utilisation of the aseous expansion all tend o make the long stroke ngine outlast its short troke brother.



3½ h.p. A.B.C., of 70 × 64 mm

Now let us turn to reults and see how the two ypes of engine have perormed in public.

Here we find that, in roportion to the number f the two types on the oad, the short stroke nakes a very poor showing.

In petrol economy we ave the phenomenal record f 320 miles per gallon by ne 64 × 77 mm. twin James 1 a Sutton Coldfield Club trial of a few years ago. Giving all credit for a wonderful performance in this ase, we do not find these results in everyday practice. Sad to relate! On several occasions in the columns f *The Motor Cycle* surprise has been expressed at the wonderful economy of the 3 h.p. Enfield twin, and, if my memory serves me correctly, "Ixion"—to drag in that unfortunate gentleman once again—on one occasion marvelled at the consumption of this particular engine being so markedly better than the figure for his "square" twin engine of considerably lower capacity.

This particular Enfield engine is a good example of a small twin engine of moderately long stroke.

In the 3½-4 h.p. class, whilst the "square" engine is content with a consumption of from 70-100 miles per gallon solo riding, the 3½ h.p. long stroke engine consistently gives from 90-150 miles per gallon under similar riding conditions.

Whilst stationed at a well-known Lincolnshire camp during the first six months of the war, my 3½ h.p. Norton T.T. averaged 120-150 miles per gallon consistently in that flat county.

A 4 h.p. engined heavily equipped sidecar outfit of the same make, 82 × 120 mm., averaged a consumption of 73-76 miles per gallon, and on one long run covered 162 miles on two gallons of No. 2 spirit over a stiffish give-and-take route along the south coast. The short stroke engined outfit of similar capacity averages from 60-70 miles per gallon, judging from descriptive letters that have appeared in *The Motor Cycle* columns from time to time.

Speed and Power.

Under the heading of speed and power the long stroke engine almost dominates the record list. Twenty-one world's class records stand to the credit of the pioneer long stroke Norton.

Amongst the smaller engines we have had the famous long stroke Levis two-stroke, of under 200 c.c. I believe that attained the wonderful speed of fifty miles per hour—a record speed for any two-stroke engine up to 350 c.c. capacity. In this class, also, the little O.K. Junior, with its long stroke engine, has made its mark.

In the 350 c.c. class the "square" engine, a special one, holds the speed records. To counterbalance that we have the long stroke engined 2¾ h.p. A.J.S.'s clean scoop in the 1914 Junior T.T.—an excellent performance.

The 500 c.c. class sees virtually four machines which can be classed as the world's fastest 3½ h.p.'s.

Three of them are long stroke engines, leaving one solitary short stroke representative. I refer to them in their order of speed as it stands at present *(pace*

The Case for the Long Stroke.—

Mr. Bradshaw)—Norton, A.B.C., Motosacoche, and Triumph. The Norton, as is well-known, is a leading long stroke motor cycle engine. The A.B.C., the solitary short stroke representative, is a redoubtable opponent, and will require watching.

The 3½ h.p. Motosacoche which broke the Norton's record in Switzerland is a long stroke engine, I believe, though I am speaking without my book. Will Mr. O. de Lissa confirm?

Messrs. the Triumph Co., after an historical adherence to the approximately square engine, recently decided that there must be something in the long stroke idea. In the hands of the redoubtable Stanley the new long stroke Triumph promptly clocks 76 m.p.h.—a speed no Triumph had ever attained before.

The Sunbeam Co., formerly square engine adherents, produce a long stroke 4 h.p. single at a 1915 open hill-climb. It promptly annexes the sidecar class at its first hill-climb, and astonishes everyone by its excellent performance.

The 5-6 h.p. Kerry-Abingdon (the performance of which at the power tests described in *The Motor Cycle*, of November 25th, 1915, was so good), the 5-6 h.p. Rudge single, the famous M.A.G. 7 h.p. twin, and the later 7-9 h.p. Indians are all examples of long stroke engine practice and have made their name, as powerful and efficient units.

In the cycle car world we have the big Blumfield twin and the M.A.G. twin more than upholding the reputation of the long stroke engine. The performance of the M.A.G. power unit, in both its air and water-cooled form, on vehicles like the Morgan has been really excellent—in fact, the air-cooled M.A.G. twin can surpass several of its water-cooled square *confrères* in continuous smooth power development.

In the light car world the long stroke engine has given us the ultra-efficient modern light car with its "lively" power unit. Amongst big cars the short stroke engine is in the minority—a condition of things that is not wholly due, as some would have us believe, to taxation anomalies.

ALEX. LINDSAY, M.B.

SOUTH AUSTRALIA M.C.C.

A Meeting at Sellick's Beach.

THE M.C.C. of South Australia still holds competitions in spite of the fact that a large number of its members are at the Front, but with those who have not gone, and now a fair sprinkling of returned men, the Club is again in a flourishing condition considering the times and circumstances. A two days' speed trial was held on the 28th (Foundation Day) and 29th of December last at Sellick's Beach. This is a very firm beach about three miles long, with plenty of width at middle tides, the only inconvenience being its distance from Adelaide (forty-three miles). Weather conditions were so delightful that most of the motorists camped on the beach all night of the 28th, but on the afternoon of the 29th rain began to fall, which caused the postponement of the mile record event for that day.

(Top) Start of one of the semi-finals in the M.C.C of S.A. one mile handicap

(Bottom) A group of competitors. V. K. Torodi (with shirt sleeves turned up) is the chief of the Indian camp. The competitor on the left, with racing helmet, is E. Ferguson, holder of several South Australian records.

The Class half-mile was followed by the South Australian half-mile record attempts for various classes (electrically timed) as follows:

300 c.c. CLASS (PREVIOUS RECORD 42s.).

E. Warren (Elliott-Villiers)	37⅖s.
N. P. Elliott (Elliott-Villiers)	39⅖s.

CLASS UP TO 600 C.C. (PREVIOUS RECORD 27⅘s.).

E. H. R. Hirthe (3½ h.p. T. J.A.P.)	27⅗s.
R. H. Abbott (3½ h.p. Kent-J.A.P.)	29s.
P. W. Carnell (3½ h.p. Lewis)	29⅗s.
E. Warren (Elliott-M.A.G.)	30⅖s.

CLASS OVER 600 C.C. (PREVIOUS RECORD 19⅗s.).

E. Ferguson (Powerplus Indian)	25⅕s.
E. C. Wagener (8 h.p. J.A.P.)	26s.
N. K. Conrad (8 h.p. J.A.P.)	26s.
H. D. Reed (8 h.p. J.A.P.)	26⅖s.
C. Gartner (7-9 h.p. Excelsior)	37s.

PASSENGER CLASS UP TO 600 C.C. (PREVIOUS RECORD 38s.).

L. S. Eglinton (3½ Kent sc.)	37⅗s.

PASSENGER CLASS OVER 600 C.C. (PREVIOUS RECORD 35s.).

*E. Ferguson (Indian sc.)	30⅖s.
*W. H. Hubbard (8 h.p. J.A.P. sc.)	30⅖s.

*Tie.

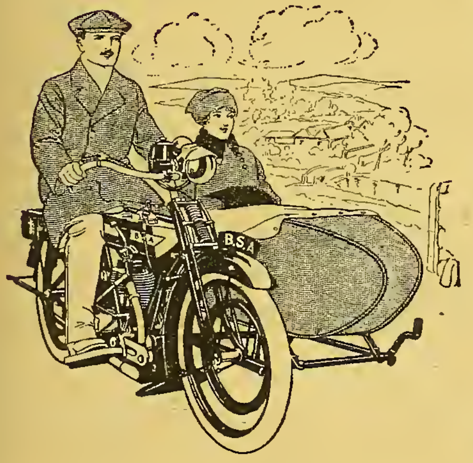
B.S.A Popularity

and why–

B.S.A. CATALOGUE
FREE ON REQUEST

EXCELLENCE OF WORKMANSHIP

The more closely B.S.A. Motor Bicycles are scrutinized and tested the more is one impressed by the excellence of B.S.A. workmanship. Every part, from the largest down to the most insignificant detail, testifies to the thoroughness of B.S.A. methods and the highly skilled attention each part receives. For many years now, the public has appreciated the value of B.S.A. workmanship, the constant growth of this popularity being fostered by concentrating on B.S.A. Motor Bicycles the most scientific processes known to modern engineering.



B.S.A
MOTOR BICYCLES

For Solo *& Sidecar*

THE BIRMINGHAM SMALL ARMS COMPANY LTD.,
Small Heath, BIRMINGHAM.

The post-war CLYNO and -

Its Power

In the Post-War period that comfortable reserve of power, so essential to your full confidence and pleasure, will be even more appreciated than in the days before the War.

And in the CLYNO you'll have an ideal machine in this direction.

Note its Engine specifications—

Twin-cylinder, 8 h.p., air-cooled, medium compression, detachable heads, valves interchangeable, adjustable tappets. Roller and plain bearings to mainshaft. Four - row caged roller bearings to connecting rods. Automatic sight-feed lubrication, with special system of oil feed to pistons.

As also the policy points we have recently announced—

Mass production of one Model

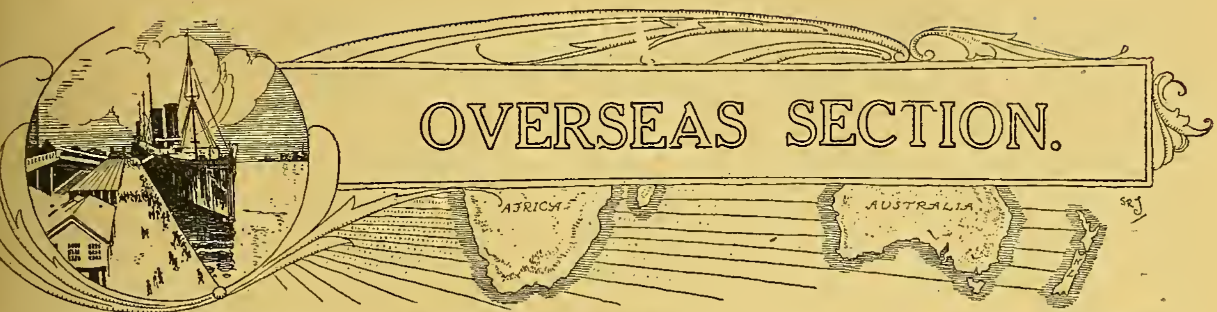
ensuring a price for both outfit and spare parts which will favourably compare with that of any other mount.

Rotational order of delivery.

Ask us now for name of nearest Agent.

The CLYNO ENGINEERING Co.,
PELHAM STREET,
WOLVERHAMPTON.

OVERSEAS SECTION.



A Commentary based upon Practical Experience and a Study of Overseas Opinions.

ear Ratios. THE question of gear ratios is one of the many questions of life which is ever vith us. The most desirable system is, naturally, one vhich permits an infinite range between, say, 3 to 1 ind 16 to 1, but such a system unhappily does not xist for a positive system of transmission. The four-peed gear box is as yet the nearest approach to it, ind is fairly satisfactory in that it permits the range of atios to be fairly close together.

Probably most Overseas riders will agree that the resent-day three-speed box falls short of perfection n that the step between the top and the middle gear s too great. When the conditions are such that contant changing is necessary, this big step up and down s a considerable handicap. There are occasions when he high gear is just a hade too high and the niddle gear a good deal oo low, with the result hat one is compelled to un for miles with the ngine turning over a ood deal faster than it eally need, with the esulting burning of alves and unwarranted onsumption of petrol nd oil.

For Overseas use, hen, it is particularly esirable that the two op gears be fairly near ogether—say 5 and 7 to , and so long as overoading were avoided, he necessity for a ratio ower than the 7 to 1 vould seldom be felt, hough a third emerency gear of, say, 14 or 5 to 1 would, of ourse, be necessary. Ve are inclined to think hat a three-speed box ermitting this range vould be more cordially accepted than one giving the resent popular ratios of, approximately, 5, 9.5, and 2 to 1. Many critics attack these typical ratios for se at home, and most of their criticisms apply with ven greater force when the machine is used under olonial conditions.

One of the motor cycles purchased by the American Poets' Ambulance Society, and used in connection with Red Cross work in Italy.

The Four-speed Box. EXPERIENCE has shown, however, that as regards its internal construction a four-speed box need be no more susceptible to breakage and very little (if any) heavier than the present design of three-speed. We should then be permitted the convenient ratios of 5, 7, 9, and an emergency gear decided by the c.c. of the engine.

It would seem that the stumbling-block, so far as Overseas use is concerned, is not so much in the gear box itself as in the striking and operating mechanism. The gate is satisfactory in that it affords a good positive stop for each gear, but it falls short of perfection owing to the fact that, should one of the rods become damaged, the gate no longer registers with the movement of the dogs or pinions, and the more gears we have to deal with the greater is the demand for perfect accuracy of adjustment—a feat somewhat difficult, and at any rate irksome, for the ordinary amateur. We have, indeed, known the operating mechanism to be so slightly damaged that it has passed unnoticed and unheeded, and the gear utilised for weeks with the pinions or dogs only partially engaging. Ultimately the fact that something is wrong is brought home to the rider by the refusal of the gears to remain in engagement, and on taking the gear box adrift it is found that the working parts are so unevenly and badly worn that extensive renewals are necessary.

All this, then, points to the desirability of the gate being contained inside the gear box, so that, whatever may happen to the levers, the various positions remain permanently set, instead of the adjustment having to be conveyed through various rods and bell crank levers, open and susceptible to damage. This system, desirable in the case of the three-speed

Overseas Section.—

box, is even more so in the case of the four, and in car practice it is customary not merely to depend upon the gate, for the selector rods are similarly notched to register with the gate, thus eliminating the likelihood of inaccuracy.

With the enclosed gate the operating mechanism can be badly damaged, but so long as it will work at all the gears can be used without danger of damaging the box internally.

The change-speed lever should possess sufficient range of movement and be of proper workmanlike dimensions—one of the most popular gear boxes of to-day being excellent in this respect, and in the simplicity of its single rod operating mechanism. Silence is a matter dependent as much upon design as upon workmanship, in that, given a wrong design, the finest of workmanship cannot bring about its realisation. This is a point which might profitably be given further consideration, but which, in the design of four-speed boxes particularly, seems often to be eclipsed by other and perhaps more necessary features. Gear boxes, like everything else on a motor cycle, are far from perfection, but are not by any means hopeless.

A Selection of Letters from Readers scattered all over the World.

South African Appreciation of the Zenith.

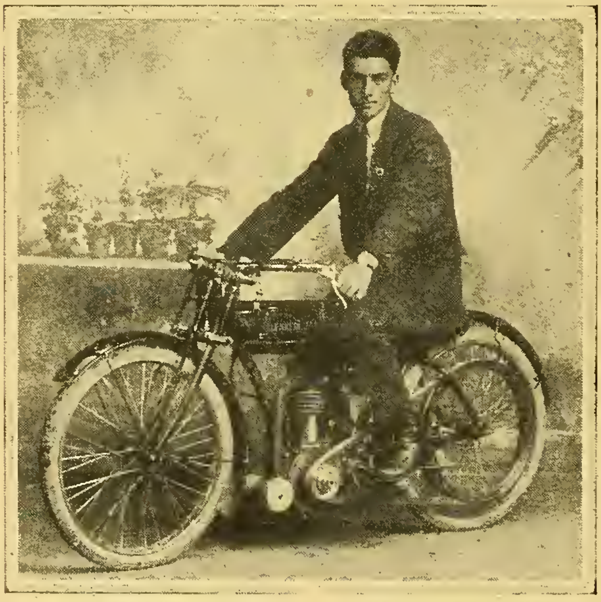
Mr. M. W. Lambon writes from Durban as follows: "On reading through the issue of October 25th, 1917, I came across a letter from Norman Wilson, entitled 'American Trade in Australia,' page 394, and should like to mention that exactly the same conditions prevail in this country.

"The old country does not, or will not, recognise the immense market there is in the colonies for the right type of machine. His ideal machine for Australia complies exactly with what is wanted here, with the exception of where he says he wants plenty of clearance between wheel and tyre, which, in my opinion, would be rather dangerous.

"Following through the numbers of the last three months, I am sure that if Messrs. Zenith Motors ship their 8 h.p. spring frame model over here, when conditions permit, they will hold their own against all comers, in spite of the machine being belt driven. In my humble opinion they have adopted the most sensible spring frame design obtainable."

The J.A.P. Engine in New Zealand.

Mr. George Toms, writing from Blenheim, New Zealand, says: "I am sending you a photograph of myself and my New Zealand-built racer, called the Blenheim-Jap. I am eighteen years old, and came to New Zealand two years before the war started. When I was in England I frequented Brooklands regularly, and was much interested in racing. Mostly I use my machine for knocking about town. It starts as easily as the Douglas. Recently I took it on the beach here—the sands are ideal for speed work—and did one or two sprints, attaining a speed of 60 m.p.h. The petrol consumption is 80 m.p.g. It is the only machine of its kind in New Zealand."



A New Zealand reader, George Toms, on a Blenheim-Jap motor cycle, a machine built up on the island.

Candid Criticism.

"An Australian" sends us the following sensible suggestions: "As a reader from Overseas and an admirer of British motor cycles, I would be pleased if you would let me have five minutes of your valuable time. I am trying my hand at criticism, which, while candid, I hope will be accepted in the best of spirit.

"*Engine* usually too small; out here (New South Wales) a large majority of riders attach a sidecar and want to go anywhere without changing gear too often. The smaller engines must be cleaned regularly, as they have not enough reserve to fall back on.

"*Carburetters.*—Is there any reason why heavier Bowden wire should not be fitted? [A pertinent question.—Ed.]

"*Gear.*—Countershaft, of course, but why hanging by four studs? The Triumph Cycle Co. criticise this method in their own words—see 1915 list, page 28: 'On many machines the tank is fastened to the top tube of the frame by means of clips, etc. For some time we have considered this method obsolete. The Triumph tank is *supported* on the lower horizontal tube, etc., etc.' If suspension were not good practice for the tank, is there any reason why it should be desirable in the case of the countershaft gear? My opinion is that the gear should be supported both top and bottom.

"*Clutch.*—In British clutches bearing surfaces are too small, there being no reserve when a little wear takes place. The American Eclipse clutch, as fitted to big Excelsiors and Reading standards, is a good clutch. The clutches in hub gears went from thick clutch plates to thin; are we going through the same evolution with the countershaft gear?

"*Transmission.*—Chain with shock absorber.

"*Wheels.*—Hubs must be wide; Rudge are a good width, although I would like them a little wider. The Rudge also have strong axles (½in. front), but they should be the knock-through type. Wheels with wide hubs do not need truing nearly as often as those with narrow ones. If Triumph made a wider front hub and fork buttress it would enable them to make a stronger spring. Wheels to be 28×3in.

"*Frame.*—In my opinion, there is only one frame on the road, *i.e.*, one that will stand up under any and every condition, viz., Rudge. This frame is a model for other manufacturers to follow. I have never seen a broken Rudge frame, although I have seen frames bent almost concertina fashion.

"*Forks.*—For simplicity Triumph, but springs break too frequently. All forks should have ball bearings like Triumph. The A.B.C. forks, according to their illustration, look all right, but the bearing parts appear too small. British forks are not wide enough.

"*Handle-bars.*—I like the idea of the A.B.C. fastening but a Rudge or Triumph shape.

"*Mudguards.*—British makers might take a lesson from the best American practice in regard to strength of mudguards. Note the strength of Reading standard mudguards. Mudguards should be as wide as possible.

"*Saddle.*—British saddles are best.

"*Oil Pump.*—Both mechanical and hand pump.

"*Silencer.*—Of the largest possible dimensions; should be made of aluminium, or similar metal, with easily detachable side or end plates.

"*Head Bearings.*—Large, take ¼in. ball bearings.

"I hope you will consider the above as a constructive criticism."

LUBRICATION-FEED SYSTEMS.

A Pump Feed System incorporating a Sump.

THE interesting article by "Chinook" on the subject of lubrication in *The Motor Cycle* of February 21st raises a number of interesting ints. In considering the matter one inevitably mes to the conclusion that manufacturers have the eatest reluctance to depart from any but the most nple forms of lubrication.

There is not the slightest doubt that a maker put on one side all considera- ns of increased weight, extra compli- ion, and considerably increased cost, could turn out a system of oil feed ich would be practically perfect. By s I do not mean that the ultimate rication of the bearing parts would perfect, because this introduces other matter, viz., the adaptability the interior of a petrol engine to per- t lubrication. I am merely taking account the delivering and retain- of lubricating oil in the crank case the requisite quantity, at a minimum nperature, and in the best condition carrying out its functions as a lubri- nt. The internal application of the ricant is a separate consideration gether.

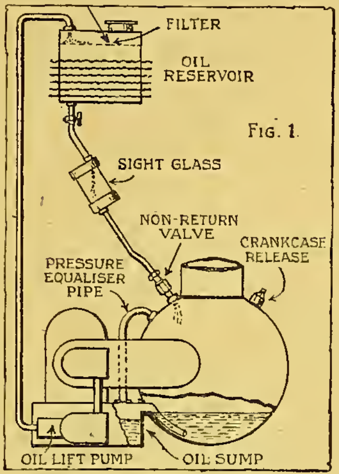


Diagram of a system of oil feed suggested by "Engro."

n feeding oil to the crank case there two evils to be guarded against—(1) giving too le oil, (2) giving too much. It is an impossibility to e the exact amount of feed required. As a com- mise, however, one can arrange to give an over ply and allow the surplus to be drained away. It or this reason that it would appear better to have sump separate from, and not integral with, the nk case. The latter system merely provides for cooling of the lubricant, and does not adequately rd against under or over oiling.

A Suggested System.

An ideal system of oil feed ht be such a one as shown in gram herewith. The system sists of a reservoir contain- n a large filter fitted with ed flanges; a sight-feed glass crank case feed; an overflow n crank case to a sump; a itively-driven oil lift pump for rning oil to reservoir.

he overflow would be fixed ards the front of the machine, that when ascending a dient there would be a slight ease in the quantity of oil in crank case, whilst in descending a gradient there ld be a greater overflow and consequently less in the crank case.

he rate of feed could be as desired, for the sump lift pump would deal with any surplus. In this maximum circulation would give also maximum ling of oil.

Some Criticisms.

What are the practical man's objections to such a system as described? Perhaps they may be summed up as follow: Such a system introduces complication, it upsets the layout of a stereotyped machine, and it adds the cost of some pounds to machines already rising alarmingly in price.

No risks would have to be taken in the design of the lift pump, consequently it would have to be of substantial size—as things go—and it would have to be of the slow speed type necessitating some form of worm gearing.

The size of the sump would naturally have to be almost equal to that of the supply reservoir, to provide for the man who forgets to turn off taps. The position of the pump would be a great bugbear, interfering with silencer and magneto positions.

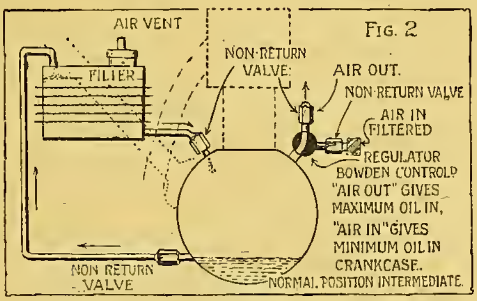
Ultimately the manufacturer—audibly heaving a sigh of relief—is quite ready to fit a hand pump or any system which approaches it in simplicity, and to trust to the otherwise good qualities of his machine to effect sales.

An alternative to the arrangement shown in diagram is perhaps worthy of mention. Instead of the mechanically driven pump with its complicated drive, etc., a *hand pump* may be substituted for transferring oil from the sump to the overhead reservoir. This, probably, would give as good results in practice as the mechanical variety, and would certainly tend to simplify matters somewhat.

An Alternative System: Circulation of Oil by Utilising Variation in Crank Case Pressure.

In this system, as in the ordinary crank case suction feed, the oil is drawn into the crank case by the upward displacement of the piston. It is quite possible to use the downward movement of the piston for expelling oil from the base of the crank case. All that is required is that there should be sufficient air in the crank case for the pressure to exceed atmospheric by a small amount when the piston is at the bottom of its stroke. By an arrangement as shown in the sketch, however, it is quite possible to vary the pressure in the crank case and so provide the required pressure, and when necessary to reduce or agument this pressure. A two-way—or really three-way—valve is shown. In one position air can be admitted into the crank case through a non-return valve. This has two effects—(1) to increase pressure in crank case so that oil is more readily expelled through discharge, and (2) to reduce the incoming quantity of oil.

ENGRO.


AIR VENT
FIG. 2
FILTER
NON-RETURN VALVE
AIR OUT.
NON-RETURN VALVE
AIR IN FILTERED
REGULATOR BOWDEN CONTROLD "AIR OUT" GIVES MAXIMUM OIL IN, "AIR IN" GIVES MINIMUM OIL IN CRANKCASE. NORMAL POSITION INTERMEDIATE.
NON RETURN VALVE

Automatic system of lubrication-circulation and cooling of oil. The amount of oil—excess or minimum in crank case—can be regulated at will by Bowden control.

CURRENT & CHAT

Times to Light Lamps.

SUMMER TIME.

Mar.	28th	7.55 p.m.
,,	30th	7.57 ,,
Apr.	1st	8.0 ,,
,,	3rd	8.3 ,,

Summer Time.

Although it will have much of the sour grapes flavour—or lack of flavour—about it, for the motor cyclist, the extra hour came as a boon and a blessing to men on the 24th inst.

The Industrial Reconstruction Council.

The Industrial Reconstruction Council is holding the second of important provincial meetings at the Assembly Hall, Edinburgh, on Wednesday, April 3rd, at 8 p.m.

Motor Cycle as Prize.

The Ixion motor cycle given by the North Wales Motor Exchange, Wrexham, in aid of the 17th Batt. R.W. Fusiliers, has been won by Mr. J. Wilson, the winning number being 11,705.

The Dunlop Rubber Co., Ltd.

The directors of the Dunlop Rubber Co., Ltd., announce the payment on April 8th of an interim dividend of 1s. 9d. per share on the ordinary shares for the half year ended February 28th, being at the rate of 17½% per annum.

Fuel Doping in New Zealand.

Many readers will remember that some time ago there was a craze among a certain type of motor cyclist for using various materials to doctor the contents of the fuel tank, the main result claimed being increased m.p.g.

Now the disease has broken out in New Zealand, and wonderful results are alleged to follow from the adulteration of petrol with a small quantity of a patent liquid.

A Grateful Soldier.

A reader of *The Motor Cycle* who is attached to the Headquarters Workshops of a Siege Park in France has written a letter to the Commandant of the Motor Transport Volunteers in the following terms: "In a recent copy of *The Motor Cycle* I see you are asking for volunteers to drive soldiers on leave between the various London termini. On the various occasions that I have been on leave the M.T.V. transport has been of great assistance. I expect to be home again in a short time, and will gladly give up two nights to help you. . . . I have had considerable experience out here, also at home, on road and track, so do not mind what vehicle you put me on. Also I know London very well. Your service is of great help to Tommy in his journey across Town. More power to your wheels!" The writer is Donald S. Parsons, well known to many of our readers as a member of the Essex Motor Club and of the Motor Cycling Club.

When daffodils begin to peer,
With heigh! the doxey over the dale;
Why, then comes in the sweet o' the year;
For the red blood reigns in the winter's pale
The Winter's Tale
Sydney R J Jones

Motor Cycles and Morals.

We have always held that motor cycle riding as a pastime is good for both mind and body, consequently we are extremely gratified to read a letter from an American lady to the F.A.M. secretary concerning her son, who is in the U.S. Army. "His lieutenant," she writes, "told us that our boy goes straight, leads a clean life . . . We gave him a good motor cycle and kept him out in the open, encouraging him to ride in the holidays. It kept him from hanging around town and away from bad company. If we had the means we would furnish every 'wild boy' with a motor cycle, and send him out to ride every time he was idle."

Special Features.

THE CASE FOR THE LONG STROK
SKIDS AND SKIDDING.
LUBRICATION FEED SYSTEMS

Gear Box Troubles.

The chief point of weakness in
countershaft gear box machines used
the various ambulances of the British
Allied armies has proved to be the
boxes. It is to be observed, howe
that the makers of military machi
especially those designed for sidecar
have realised this weakness, and
now turning out enormously strengthe
gear boxes.

The Loan of a Motor Cycle for a Lady.

A lady engaged on important
work would be glad if any reader w
be willing to loan her a motor cycle
the execution of her duties. Referen
of course, would be provided, and e
care taken of the machine. If any re
would care to respond to this request,
shall be pleased to put him in commu
tion with the enquirer.

Aeronautical Trade Route.

Rear-Admiral Mark Kerr, a membe
the Air Council, said recently that
of the first air routes the French
going to establish after the war i
Timbuctoo, when the journey will
only take four days, whereas it use
occupy four months. As a comme
undertaking that will result in a
saving. Four months' food alone w
be a considerable item.

The Motor and Sport.

Several writers in a Canadian spo
magazine, *Rod and Gun in Canada*
denouncing the motor for the detrim
effects it is having upon hunting
fishing. "Improved roads and the
mobile," they say, "will bring abou
extermination of our game birds
beasts"—a state of affairs for whic
cannot blame the automobile, sin
merely indicates the fact that the
laws are out of date and need rev

Angling in England.

In this country the motor has ren
accessible to city dwellers many exc
angling and shooting areas which
enjoyed only by a select few, and
is no doubt that after the war many
sportsmen will be clamouring for
fields. All over the country are
found excellent reservoirs, which
prove remunerative to their boroug
stocked with rainbow trout, for it
be borne in mind that each year f
becomes more and more difficu
obtain. Ten years ago very few rese
would have paid for stocking, owi
their inaccessibility, but the moto
changed all this, and it is to be
that those with authority in such m
will see their way to maintainin
sporting facilities of the country.

il from South Africa.

We are informed that an old whisky istillery at Hetherly (Transvaal) is eing converted into a motor spirit pro-ucing plant.

aution.

Motor cyclists should drive with special aution on the main Harrow road be-ween Stonebridge Park and Wembley. We are informed that the police on this tretch of road have been particularly watchful during the past few weeks.

New Ignition.

A speaker at a recent meeting of a Graduates' Section of the Institution of Automobile Engineers explained a new ystem of ignition which may be used in ost-war racing machines. We are not ermitted to give further particulars, xcepting that a spark "right across the ylinder" is possible.

American Motor Cycle Repair Shops.

The same care and economy in the repair of motor cycles is now exercised in the United States as in England. In the early days there was just as much waste in the U.S.A. as over here, but when these repair shops are properly organised they are sound in efficiency and economical in their working, being run on a thoroughly businesslike line, as we can state after the many visits we have made to various M.T. motor cycle repair shops in the London area. Touching the work in America, it is interesting to note that there is no branch of the Service to which motor cycles are not attached, which is more than can be said of any other means of transport.

The Federation of American Motor Cyclists.

The Federation of American Motor Cyclists is in the United States what the Auto Cycle Union is in this country. We learn, certainly with some surprise, that Canadian motor cyclists are anxious to ally themselves to the F.A.M. This seems a curious idea, because, however efficient a body the F.A.M. may be, we should imagine that Canadian motor cyclists were quite capable of organising their own governing body, and so be independent of control by a body belonging to another nation, however good the feelings between the sister countries may be.

Record Attempts at Easter.

Harry Martin, who is now on the aircraft staff of Messrs. H. Collier and Sons, Ltd., will be riding on Herne Hill Track on Good Friday, at the request of the S.C.C.U., at the meeting held for military charities (nominated by the War Office). He will make attempts on the five miles and one mile track records. Harry Martin, who is fifty-two years of age, is well known to our readers as one of our oldest racing motor cyclists.

The meeting begins at 2.45. Tickets and further information may be obtained from J. H. Stapley, the hon. secretary, Southern Counties Cyclists' Union, 169, Ferndale Road, Clapham, London, S.W.

In view of the rareness of motor cycle competitions—none has been held for nearly three years—the events should be interesting.

Local "Fashions."

We have heard of a case where a certain motor cycle remained on the hands of a colonial agent for over twelve months, merely on account of the shape of the handle-bars, which illustrates the necessity for our manufacturers thoroughly to understand local likes and dislikes, as well as the conditions under which their machines will be used.

Death of a Well-known American Motor Cyclist.

We regret to learn that Alan T. Bedell, who was learning flying in America, died recently after suffering from measles followed by pneumonia. He broke the American motor cycle record last March, on which occasion he covered 1,153.5 miles on a Harley-Davidson in twenty-four hours at Ascott Track, Los Angeles, and a few months later broke the coast-to-coast record on a Henderson, covering the 3,296 miles in 7 days 16 hrs. 16 mins. Bedell was held in high esteem by all who knew him as being a thorough sportsman. His death will be a great loss to the American motor cycle world.

Motor Cyclists Wanted.

The County of Middlesex Motor Volunteer Corps, Southern Group, is anxious to enrol motor cyclists. They undertake night transport work in taking troops across London from one terminus to another, and need drivers not only of motor cycles but of cars and lorries, and require the use of these vehicles in their corps.

Uniforms are supplied, and there is no subscription to the corps. On Mondays there are lectures on motor vehicles, and on Thursdays there are drills and map reading. Every man in the corps has to be a motor driver, and tuition is given free. The headquarters of the corps are at 11-12, Silver Street, London, E.C.2, where application should be made, or to Capt. A. Horsfield, manager of the motor department, Messrs. Selfridge, Ltd., Oxford Street, London, W.1., who has done valuable work for the corps.

The Parent Tyre Co., Ltd.

The Parent Tyre Co., Ltd., announce the payment on the 30th inst. of interim dividends on the preference, ordinary, and deferred shares for the half year ended February 28th at the rate of 5%, 8%, and 24% per annum respectively.

Dissatisfied.

When petrol was 1s. 6d. per gallon, many motor cyclists grumbled because they could not take three persons more than sixty miles on a gallon of fuel. Sixpence per person, or ten miles for a penny. Now ——?

A Sulky Sidecar.

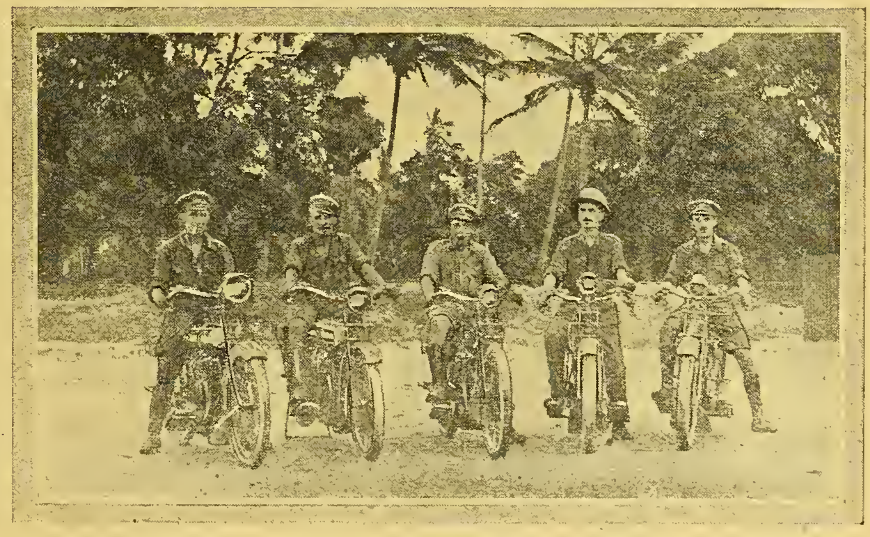
Recently we were much mystified by the reference, by an American correspondent, to an illustration we had published of a "sulky sidecar." On referring to the issue mentioned, however, we found that our Overseas friend had in mind a racing bodyless attachment fitted with footrests and a saddle.

No Smoking Allowed!

They are very strict with riders of motor cycles with visible exhausts in Western Australia. Recently a young man in the trade was demonstrating a new machine to a customer, but had only ridden it a hundred yards or so when a policeman stopped him, and he was promptly haled before the "beak" and fined.

"Some" Engine.

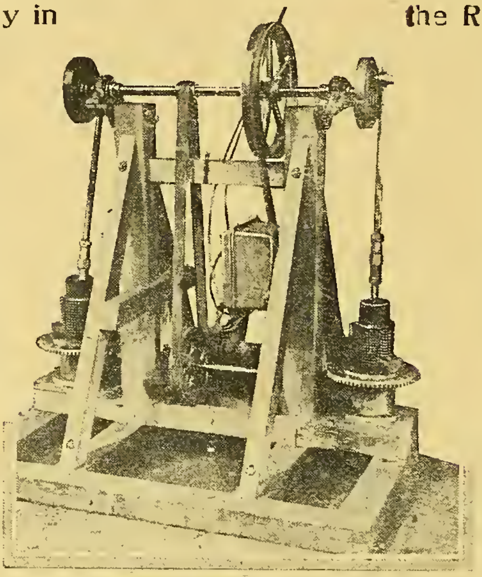
We have before us the specification of a shaft-driven runabout which, before the war, it was intended to market at £80. The engine is described as "*12-16 h.p., two-cylinder, air-cooled, 98×127 mm. bore and stroke, with specially designed piston valves, mechanically operated and interchangeable (no tappets, springs, collars, cotters, etc., to get out of order).*" The capacity of this engine would be nearly 2,000 c.c., and a correspondent asks us for particulars regarding its oil consumption per mile.



A group of D.R.'s in East Africa, taken at Dar-es-Salaam. The names of the men, reading from the left, are: Cpls. Wood, Gooden, W. Day, E. E. Smith, T. E. Brown and G. Wood. They are all mounted on B.S.A. motor cycles.

R.F.C. MOTOR CYCLE REPAIRS.

An Interesting Day in the R.F.C. Repair Shops.



The ingenious cylinder lapping machine, which imparts a reciprocating motion to the pistons and a rotary motion to the cylinders.

THE peculiar conditions under which the Royal Flying Corps works render the corps unique in His Majesty's Army, in that it is the only branch thereof that possesses its own transport system. The M.T. section of the Army Service Corps acts as carrier to all other branches of the army. When the R.F.C. was quite a small force the aeroplanes and their equipment required constant attendance, consequently the transport section was founded quite early in its history, but as the corps grew so the numbers of four-wheeled vehicles and motor cycles increased, and two years ago the M.T. branch reached such dimensions that it required special supervision and reorganisation. This work has been entrusted to, and successfully carried out by, an Acting-Director of R.F.C. Mechanical Transport, a well-known motorist of vast experience whose name has often been mentioned in our pages as President of the Motor Cycling Club.

Some idea of the work involved may be gathered when it is mentioned that the motor cycles alone are covering 500,000 miles per month. The organisation is now just about as good as it can be. The vehicles are all standardised; only two or three makes of cars and lorries are employed, and the motor cycles are now all P. and M.'s. The result is that a comparatively small stock of spares is kept, and the work is considerably simplified. All machines which were not of standard make have been returned to the A.S.C., M.T. Throughout the whole scheme of organisatio economy is the keynote, and waste is practically non-existent. Petrol is used with the utmost caution, and cases of waste are most severely dealt with. Even the dregs from the empty cans are collected drop by drop into a cask and what is collected is used. Depots and garages are inspected at intervals, and reports as to the condition of the vehicle and the way they are used are sent in to headquarters from time to time, and due note, we ma assure our readers, is taken o places where all is not in the most perfect order. In additio to the numerous M.T., R.F.C units scattered throughout the country, the organisation includes a huge garage in the Metropolitan area a distributing centre and training school, and a larg repair depot whither all serious repairs are sent.

The Motor Cycle.

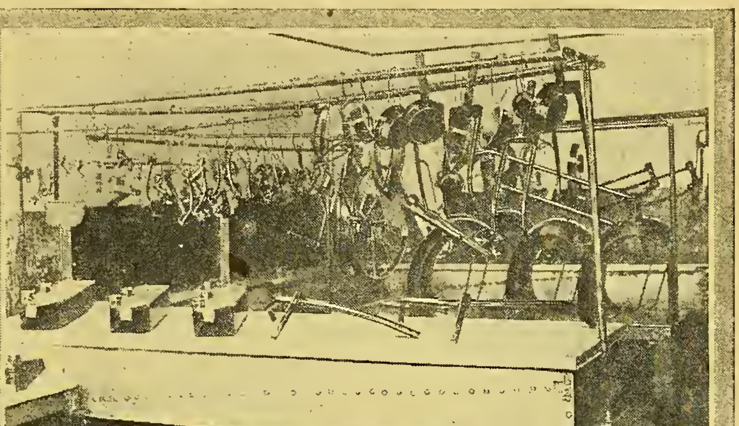
The chief motor cycle repair depot is under th supervision of a well-known motor cyclist, who fo some time was a member of the staff of this journal and served with the Red Cross in 1914, thereby ear ing the Mons medal. The motor cycle shops are we equipped but rather badly lighted. Quite near th entrance there is an interesting tool used for cleanin

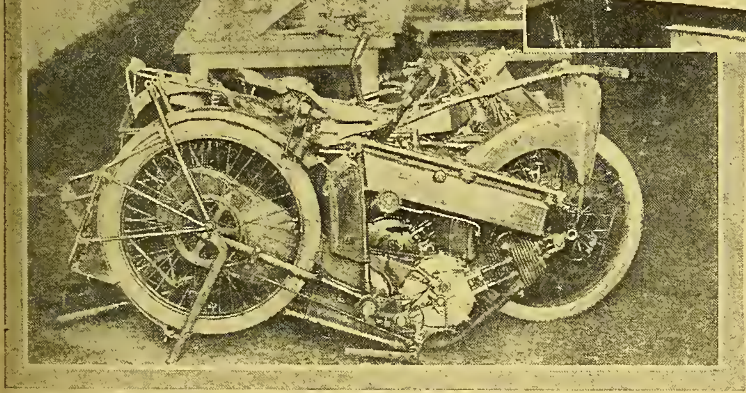
Frame, chain, and tank repairs in the R.F.C. motor cycle repair shop. The Officer in Charge of Motor Cycle Repairs is standing on the right of the picture.

R.F.C. Motor Cycle Repairs.—

parts before repair. It is mounted on a grinder stand, and is driven off the shop shafting. It consists of a "mop" with a phosphor bronze centre, from which radiate equal lengths of discarded aero cable. The parts are first cleared of grease by immersion in baths of caustic soda, and the cleaning is finished by means of this tool. All the ovens and tanks in the enamelling shops were made on the premises by R.F.C. mechanics.

The parts to be enamelled are dipped in a tank, and before being stoved are hung up to drip, all drippings then run back to the tank and thus waste is avoided. The wire wheels used on the cars and tenders are also enamelled in this shop.





(Top) Parts ready for stoving in the enamelling shop.
(Bottom) Motor bicycles sent from Overseas awaiting repair

Near the entrance to the main repair shop there was a stack of badly damaged machines from Overseas, sent in for repair. As we walked the length of the shop we noticed one man fitting new rollers to chains, next to him frame repairs were being carried out, while on an adjoining bench silencers were being dismantled and overhauled. Even saddle repairs are effected by skilled R.F.C. men.

The method of lapping cylinders is also most interesting, not only in itself, but in demonstrating how all parts are used up and practically nothing is scrapped. The machine employed is equipped with old P. and M. flywheels, and imparts the necessary reciprocating motion to the pistons through a pair of cranks and connecting rods. while to ensure perfectly uniform lapping the cylinders are mounted on discarded Crossley crown wheels driven by bevels, by which they are turned. Near by we passed the benches on which engine and gear repairs are carried out, and came across an old friend in another well-known motor cyclist, F. J. Watson, who before the war gained a well-earned reputation as the skilful rider of Swift motor cycles in numerous competitions. Lastly we were taken into a small but compact little testing shop in which there was a test bed on which the P. and M. engines are mounted before undergoing their power test after repair. The engines are made to drive a fan brake, and the r.p.m. are shown by means of a revolution counter. Before bidding adieu to our guide we inspected some substantially built three-point suspended sidecars used by the R.F.C., and spoke in glowing terms of the behaviour of the P. and M. motor bicycles. The officer who showed us round, the O.i/c T.R.S.—Officer in charge of Transport Repairs—was an enthusiastic motor cyclist before the war. He had not long returned from France, where he had met J. D. Drysdale, who used to ride a Hazlewood; R. O. Clark, the F.N. exponent; and E. Kickham, Douglas expert.

THE PREJUDICE AGAINST OVERHEAD VALVES.

A LEADING manufacturer informed me the other day that he would have scrapped side-by-side valves years ago, but for the fact that the average buyer will have nothing to do with o.h.v. I was amazed to learn that such a prejudice exists. It is certainly non-existent in sporting circles, and it is not easy to account for its prevalence amongst the potterers. Presumably they have been frightened by ancient tales of broken valves smashing the piston. The maker in question was rather dubious about his post-war design, considering that the prejudice against o.h.v., of which he spoke quite dogmatically, would still be invincible. It is quite probable that any firms who cling to the side-by-side valve will "crab" the o.h.v. to the best of their ability and repeat or invent tales of its dangers in bygone days. Nevertheless, it should be perfectly safe to plunge on o.h.v. Broken valves must be the sole root of the suspicion which used to exist, and broken valves have been few and far between of late years.

If makers will be conscientious for a year or two, and avoid using cheap and unsuitable steels, this silly prejudice will die a natural death.

ROAD RIDER.

THE AUTO CYCLE UNION.

ANNUAL GENERAL MEETING AND ELECTION OF OFFICERS.

THE annual general meeting of the Auto Cycle Union was held at the Royal Automobile Club on Thursday, March 21st, at 4.30 p.m., Mr. Otto Thomas in the chair. The meeting opened by the Secretary reading the minutes of the last annual general meeting, and a letter from Sir Arthur Stanley, regretting his inability to attend. It was proposed by Mr. E. M. P. Boileau, and duly seconded, that the existing president and vice-presidents of the Union should be re-elected. This was put to the meeting and duly carried, while it was further decided that the three following gentlemen's names should be added to the list of vice-presidents: Colonel F. Lindsay Lloyd, C.M.G., Messrs. E. M. P. Boileau and Otto Thomas. The officers of the Union, therefore, now stand as follows: President, the Hon. Sir Arthur Stanley, K.B.E., C.B., C.V.O., M.P.; vice-presidents, Professor C. V. Boys, F.R.S., Lt.-Col. A. E. Davidson, D.S.O., S. F. Edge, Esq., Brigadier-General Sir H. C. L. Holden, K.C.B., F.R.S., Lt.-Col. D. F. Nicholl, D.S.O., J. R. Nisbet, Esq., Colonel M. O'Gorman, C.B., G. F. Sharp, Esq., A. J. Wilson, Esq., E. M. P. Boileau, Esq., and Otto Thomas, Esq.

Appointment of Chairman.

On being elected vice-president, Mr. E. M. P. Boileau thanked Mr. G. F. Sharp for proposing him, and the meeting for electing him, to this post. He said that he had worked hard for the Union during the last fifteen years, but this work had been a labour of love, and he greatly appreciated the honour which had been conferred upon him.

The Chairman then referred to the annual report, which is a splendid record of the magnificent work of the Union during a very difficult period, and also to the balance sheet. At the conclusion of his remarks, he mentioned that he was vacating the chair in favour of Mr. Nisbet, who had been elected chairman of the A.C.U. Mr. Nisbet then presided at the meeting. He said that when he vacated the post of chairman three years ago he rather felt that he was leaving the Union in the lurch at a very critical time; however, Mr. Otto Thomas had achieved excellent results. He felt that the Union had been well maintained, and that it owed Mr. Thomas a very deep debt of gratitude.

Mr. G. F. Sharp then rose to say how much the A.C.U. had appreciated the work of Mr. Thomas during the last three years, and desired to pass a resolution to the effect that the meeting records the greatest appreciation of the work of Mr. Otto Thomas during the last three years, and asks him to accept the post of vice-president. This was seconded by Mr. H. P. E. Harding, and carried unanimously.

The Retiring Chairman's Reply.

Mr. Otto Thomas in his reply expressed his gratitude for the honour which had been done to him, and said that his one object while he held the post had been to further the work of the Union to the best of his ability, without having regard to his personal interests, though he felt at times that he occupied a somewhat invidious position. He would like to testify to the splendid loyalty and help he had received from Mr. T. W. Loughborough, who was an ideal secretary, and to his colleagues on the Management Committee, Mr. A. W. Torkington (the treasurer), Mr. H. P. E. Harding, and the Rev. E. P. Greenhill.

There being no business other than the submitting of the fifteenth annual report and balance sheet, the chairman declared the meeting closed.

"THE LIGHT CAR."

Cessation of Publication of a Sister Journal of "The Motor Cycle."

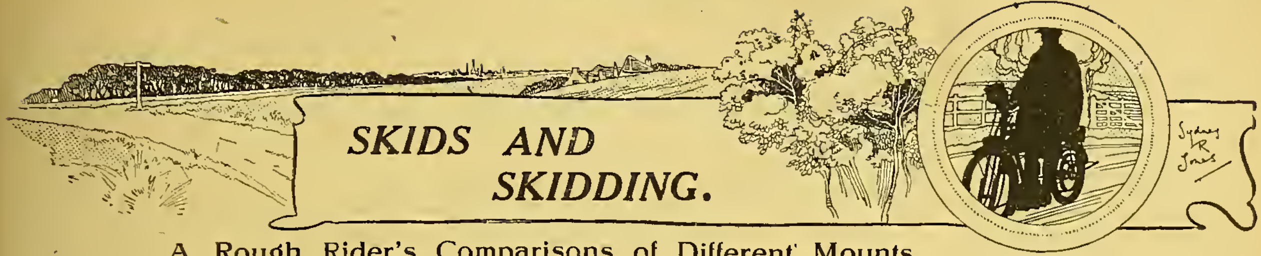
THE issue dated March 27th is to be the last of our sister journal, *The Light Car*. Development of small cars has of late years approximated more and more closely to large car lines, and as a result the light car has justified its patronage by *The Autocar*—which is essentially the journal for all private owners of four-wheeled vehicles.

At the present time, as a result of the really serious paper shortage, the continuance of two journals overlapping in their scope borders on the unpatriotic, and consequently light car users and all interested in these flourishing vehicles will find all that concerns them and their motors fully and competently handled by the oldest motoring journal—*The Autocar*. *The Motor Cycle* will, for the time at any rate, put a rather more liberal interpretation on the term cycle car for the purpose of deciding whether any individual example shall be described in its pages.

Readers who are specially interested in this matter are referred for further information to *The Light Car* of March 20th and *The Autocar* of March 23rd, in which it is fully treated editorially.

Every phase of the motoring movement is now covered completely by three sister journals. *Motor Traction* deals with every type of mechanical business vehicle. *The Autocar* deals with private cars of all kinds, while *The Motor Cycle* covers all vehicles of the cycle type.

Cpl. W. H. Baty, R.E.
He speaks well of the way the Douglases stand up to their arduous work in Mesopotamia.



SKIDS AND SKIDDING.

A Rough Rider's Comparisons of Different Mounts.

DURING the winter the writer had a most excellent practical experience of the art and phenomena of skidding, for he was stationed in the midst of a huge dump of disabled vehicles, which being mostly towed to their resting places by caterpillar tractors, had cut deep furrows into the soft and yielding ground, thus rendering the use of a solo machine anything but a pleasure.

Every variety of adverse weather, from rain through heavy snow to intense and continued frost, was experienced, and it is doubtful which provided the worst conditions, for each phase had its own peculiar terrors and difficulties, and there was every opportunity of making comparisons between the three very dissimilar mounts which were used, viz., a 4 h.p. Douglas, a 7-9 h.p. two-speed spring frame Indian, and a Scott.

The Indian was considerably heavier than either of the other two machines, and on wet grass and mud cut up by the passage and repassage of lorries its extra weight was of some assistance in enabling the rear wheel to bite through to solid ground, and thus gave it the advantage in respect of immunity from wheel slip, despite the more even torque of the other engines.

On really rough going the spring frame was not wholly a success—that is to say, it gave no more actual comfort than the excellent saddle and footboard springing of the Scott—whilst the crossing of deep holes would result in the carrier dealing a smashing blow at the base of the spine, which was decidedly unpleasant, if not actually dangerous.

Illustrating the disadvantage of a heavyweight motor cycle. The rider fell with one leg under the machine, and was unable to release himself unaided.

Carburetters—Automatic or Hand-controlled?

Possibly on account of the extremely cold weather the carburetter was somewhat sensitive to the extra air setting, and for ploughing through heavy, clinging mud at low speeds the pilot jet did not give sufficient power, and there was a noticeable "dead spot" before coming on to the main jet, which often gave rise to violent and occasionally disastrous accelerations if the throttle were carelessly manipulated.

Under normal road conditions this would not have been so noticeable, but it served to emphasise an advantageous detail of the American type of clutch, for in order to counteract the somewhat violent effects of opening on to the main jet too suddenly whilst floundering in soft mud, it was delightfully simple to set the clutch hand lever in such a position that only a definite torque was transmitted, beyond which clutch slip prevented any untoward consequences.

The two-lever carburetters on the English machines gave infinitely greater control simply because the extreme atmospheric variations demanded some adjustments of the air supply. When warm, however, the Douglas would run at all speeds up to 40 m.p.h. without alteration of the air lever, whilst the B. & B. fitted to the Scott required about quarter air up to 25 m.p.h. and almost full air beyond.

A Few Criticisms.

Carburetter settings such as these are practically automatic, and the convenience of having the extra air control at the finger tips *when needed* is surely preferable when compared with a system whose "automaticity" includes the occasional operation of a prehistoric type of shutter on the carburetter itself.

During the spells of dry, frosty weather the 4 h.p. Douglas proved a very excellent mount, with a speed utterly unusable under the circumstances, but it had defects which were very noticeable during rain and snow. The chief of these was the insufficient clearance, and in crossing soft ground it was all too frequently a case of finding the back wheel spinning merrily owing to the footboards and silencer resting on the bosom of Mother Earth. The belt, also, owing to its short centres, was necessarily run abnormally tight, otherwise it slipped abominably.

At temperatures so bitter that flooding the carburetter resulted in covering the float chamber with hoarfrost and ice, the long induction system of the horizontal engine was not conducive to easy starting, but under such conditions engines of any type are a trifle *difficile*.

Skids and falls were much less frequent with the Douglas than with the Indian, because, although the former is by no means a machine with which I

Skids and Skidding.—

readily feel "at one" when riding solo (as a sidecar machine it is quite excellent), yet the low and even distribution of weight tends to keep it upright.

It is very curious how this machine gives a somewhat unjust impression of unrideableness and an alteration of the frame design might obviate this.

The low and short steering head, combined with the rearward position of the saddle, contribute to a sense of insecurity which is heightened by the awkwardly placed clutch pedal at the front and the brake at the rear, spreading the feet in a most unhappy manner for solo riding. This lack of unity between rider and machine is more apparent than real, however, and the stability was quite good, whilst really lurid skids were generally checked by the low footboards, sometimes to their detriment!

The Douglas was practically abandoned as being more suitable for "the 'ard 'igh road" (which was not there), and the Scott used more frequently.

A Twin Two-stroke.

The narrow standard handle-bars of the Scott were immediately scrapped (*pace* the work's experts) and a pair of Douglas semi-T.T.'s substituted, which gave wonderful control, but were just a little far forward for complete comfort.

Riding position, weight distribution and the ease with which a varying amount of slip could be obtained on the low gear rendered it possible on this machine to cross deep mud, inundated grass land, or partly thawed ruts (the worst of all!) at any angle with the certain knowledge that in skidding it would right itself rather than fall.

It is rather curious that, although the ground clearance of the Scott is not by any means too great, the "streamline" arrangement of the undershield and the freedom from rigid projections capable of spragging the machine give it a rather fascinating power of lifting itself through rough going in which more conventional designs would become hopelessly embedded; another interesting feature is the flexible attachment of the footboards, shields, etc., for, although these devices are violently execrated by the rule-of-thumb mechanic, in conditions where smashes are inevitable non-rigidity of certain parts—essentially so designed, of course—may prevent much of the irreparable damage sustained by more orthodox structures.

Summary.

Comparing the three types, the American machine would no doubt be the ideal pioneer type of machine, provided it was always ridden by the ideal pioneer type of man, but for an individual of ordinary size and strength its huge bulk and weight, combined with the high saddle position, render it (on really atrocious surfaces) a somewhat difficult machine to maintain in an upright position.

The Douglas suffered wholly from not being designed for rough country work; its insufficient ground clearance impelling one to be continually seeking the corrugated but comparatively even tracks of the "Holt Caterpillars," whilst its capacity for speed could never be used to full advantage.

It is indeed doubtful if the fast-running flat twin is exactly suited to such conditions as described, for the Scott engine was much more satisfactory, since it was possible to run it so slowly that balancing became difficult, and yet maintain good power.

Of the "rideableness" of the Scott it can only be said that an average, not-too-daring rider may take liberties with this machine not permissible on any other design whatsoever.

These little experiences give a few pointers to features it would be desirable to incorporate in any machine sold for use away from the beaten tracks, viz., good ground clearance, with freedom from rigid projections beneath the machine; frame design permitting a riding position conducive to a sense of unity between man and mount; low centre of gravity; and, lastly, a smooth-running engine capable of giving good power at low speeds.

WHARFEDALE.

CONSERVATIVE RIDERS.

The One Machine Enthusiast—and his Intelligence.

THERE is no accounting for tastes. One still comes across riders who swear by the direct belt-driven single, while everyone else swears *at* it. I know one commercial traveller who weighs at least fifteen stone, and who uses a Baby two-stroke for his long rounds over mountainous country. Regularly he carries huge loads behind, regularly he has to foot-slog up almost interminable mountain ascents, yet, in the face of all obvious fact to the contrary, he emphatically declares that his is the one and only machine suited to his particular requirements.

But for real narrow-minded obstinacy in the choice of machines a certain breed of untravelled Scotsmen I know take some beating. In one little corner of the Lowlands, prior to the war, every machine one saw was a P. and M. According to this little group of riders the P. and M. was the only motor cycle with any workmanship about it, the only machine of decent design, the only mount worthy of a practical engineer and a gentleman. Personally, I appreciated the sterling qualities of the make, but after a few weeks in that district I began to loathe the P. and M.'s. Every few months I made a point of turning up on a 2¾ h.p. works tuned Sunbeam, or A.J.S., or Douglas, taking on the best P. and M.'s of the neighbourhood, and beating them hollow. No matter. The P. and M. remained superlative, and when, on one occasion, my brother and I turned up respectively on a Scott and a four-cylinder F.N., we were simply scorned and jeered at as trouble seekers and experimentalists. I thought we should be *mobbed*, and the amusing part of the whole business was that not one of those dictatorial Scots had ever ridden anything but a P. and M.! One comes across a similar type of Triumph enthusiast. Everyone admits that the Triumph is a good machine and a splendid job, but—ye gods!—it is not the only motor cycle on earth! Changes are pending, and the old conservative brotherhood will do well to widen their outlook and give the new ideas a chance.

KICKING HORSE.

Letters to the Editor

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle" Hertford Street, Coventry, and must be accompanied by the writer's name and address

UTSIDE FLYWHEELS.

Sir,—Concerning the article in February 14th issue of *The lotor Cycle* on outside flywheels by "Chinook," anybody ho has tried starting an engine with internal flywheel and ue with external flywheel on a frosty morning has no doubt hich is the better for a motor cycle engine. I do not now of anything more exhausting than getting to start an iternal flywheel engine that has got well "gummed up."

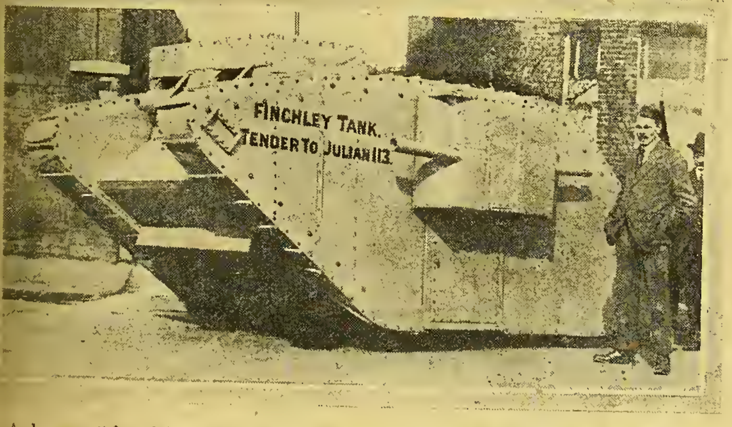
It has occurred to me that an engine—especially a flat win—fitted with *two* external flywheels, one on each end f the crankshaft, would make a beautifully smooth running nit, and do away with a lot of whip in the crankshaft. he opinion of some experts would be interesting.

The majority of flat twins that have been put on the narket up to the present have been short-stroke engines, vith the result that they have not been good top gear nachines. I think that a fairly long stroke would make hem much more dogged and better for sidecar work. My dea runs on something about 65 × 90 mm. Revs. are all ight in their way, but you can get somewhat tired of them n a long journey, particularly on a road like the Great North Road.

K. V. CHIDLEY.

HE "TANK" AT FINCHLEY.

Sir,—I am sending a print of a scale reproduction of a "Female" Tank I made for the Tank week in this district North Finchley). The whole thing is mounted on my -9 h.p. Humberette (water-cooled), and has had a lot of ard use. In all, I have driven about forty miles on low ear, and occasionally there have been three people (including myself) in the car. This is a somewhat hilly district.



A dummy "female" Tank mounted on a 7-9 h.p. water-cooled Humberette, and used during the Tank Week at North Finchley.

The Tank is a scale reproduction of the big Tank, and ccupied about six weeks in building. It consists of main ooden frames and canvas covering, button moulds for rivets, nd cardboard tubes for guns.

I think the way the old 'bus has held up to the severe train is just wonderful, especially as it meant mostly low ear work. The water in the radiator boiled once, partly ue to slight leakage.

G. H. W. RANDELL.

GUDGEON PIN SCREWS.

Sir,—Some little time ago an incident happened to me similar to that which befell G. H. Marshall. I had just started on a trip, and had got about two miles from home, when the grub screw of my piston worked loose, but, instead of working down into the bearings, it fell on to the top of the crank case, and the piston, coming down, struck the screw and embedded it in the aluminium. My machine, which I was riding solo, came to a sudden stop, and, fortunately for me, I was going very slowly, otherwise I should have had rather a nasty spill. In my case, when I had my machine down for overhauling I neglected to replace the pin that helps to support the grub screw, with the above consequences.

It was a lesson to me, and I hope that other readers will be more careful when assembling their machines.

H. CHANEY.

THE BICYCLIST'S EQUILIBRIUM.

Sir,—The following remarks are intended by me to add to the oil which "Mohandis" has poured upon the troubled waters of discussion *re* the forces holding a ridden cycle upright.

I feel complimented by his kindly references to me, and his agreement with my opinion. Particularly am I glad of this, because it was in support of his own contention that I first "chipped in." Then he expresses lucidly my impression of the article by Mr. Jones, recently published in your journal, when he says he "must have studied a different brand of rigid dynamics from that favoured by Mr. Jones." In fact, I had written a question to yourself, Mr. Editor, asking "if a ridden cycle could travel in a straight line." I previously considered it impossible, but the eminent source of the article in question deterred me, for, as I previously hinted, I am not an engineer, but am only "tainted" through environment.

Lastly, regarding your footnote under the article by "Mohandis" to the effect that you are about to publish "conclusions" of this subject, viz., the forces which uphold a ridden cycle.

My opinion about this is: That you may arrive at conclusions without duly taking into consideration the physical strength of the rider, but you will never arrive at the true solution of the problem unless you fully appreciate the element which I am emphasising, and primarily gauge the exact physical strength exerted by the rider when he turns the handle-bar, and deduct therefrom the quota of power lent by gyroscopic action of the wheels and centrifugal force, which, as "Mohandis" points out (and, indeed, italicised on page 253 of March 14th issue of your journal), assists the rider to turn the handle-bar in the direction required. These two forces, being the servants or assistants of the rider, are governed by him. He uses them, and his own strength and weight, to master the tyro's arch-enemy, gravitation.

Therefore, Mr. Editor, no one can define or gauge the respective power of any one or all of these forces, because they are ever-changing, but I look forward with pleasant anticipation to the promised articles.

Please be good enough to bear in mind that I am only expressing my opinion, and have no wish to lay down the law.

TOP HEAVY.

AUTO WHEELS.

Sir,—Permit us to point out that the American Smith Motor Wheel, illustrated and referred to in pages 237 and 243 of your issue of March 7th, is manufactured under licence from us, as we hold the master patents for the Auto-wheel in every part of the world.

We still hold our stocks of Auto-wheel spare parts which were manufactured prior to the war, and are enabled to execute repair work, in spite of the fact that a large number of our men are on active service, through the consideration and help of our present staff, who carry out this section of the work in their spare time.

AUTO-WHEELS, LTD.
W. H. THOMAS, Manager.

LUBRICATION IN INTERNAL COMBUSTION ENGINES.

Sir,—I note that Raymond W. Shimmins in *The Motor Cycle* of March 14th accuses me of making statements as to the relative life of steam and internal combustion engines which are "obviously absurd." One of my statements was that certain types of steam engines have the cylinders cast thick enough to allow for several reborings. This I think you will find correct if you discuss the matter with any locomotive superintendent of a big railway company. The fact that some other engine did not want reboring has nothing to do with the case.

Now with regard to the gas engines. I quoted an engine that I knew was in good condition after seventeen years' work. Raymond W. Shimmins says it was fit for the scrap-heap. *Bon.*

I enclose the name of the owner, and, if you care to, you can verify the facts, and also publish your ideas as to whether he was a man who would care to run an engine fit for the scrap-heap and whether he was a competent man to judge whether it was so.

Perhaps Raymond W. Shimmins read my expression "seventeen years' continuous work" as meaning that it ran night and day for seventeen years without stopping. If so, I may say that I did not mean this, and I do not think many people would read it so.

Let us remember the point under discussion, which is simply whether *every* steam engine is *per se* far more durable than *every* internal combustion engine simply because it is a steam engine; or whether the short life of certain types of petrol motors is due to their being very light and running at a high speed under adverse conditions, etc.

F. STRICKLAND.

[The name of the owner of the engine is well known, and we accept our correspondent's statement.—ED.]

A PLEA FOR LOWER GEARS.

Sir,—I must first thank you for the sustained—indeed the increasing—interest of *The Motor Cycle.* I find therein almost weekly letters or articles which make me wish to take part in discussing them, and which I read again and again to make sure no word or turn of a phrase has failed to reveal its whole meaning.

I hope you are preparing to start a weekly called *The Cycle Car,* for although the subject is dealt with both in *The Motor Cycle* and *The Light Car,* it will obviously require separate attention soon.

The contributions of "Ixion" and "Chinook" especially interest me, and one gathers that these writers have had very great experience of motor cycling. How I envy them when my own few paltry thousands of miles remind me that I had best "lie low and say nuffin"! However, I have a suggestion to make, and, so that it may appear reasonable, must first relate my experience.

I have had a phase of riding in which the highest possible average speed *while running* was attempted during journeys between London and Peterhead. My best effort was 21 m.p.h. on a 1913 three-speed James-Canoelet for the 558 miles, coming south, using neat paraffin at the rate of 90 m.p.g. (These figures were most carefully observed.) Incidentally, the frame has since broken after a smal further mileage at low speeds.

I came to the conclusion that it was not worth whil exceeding 25 m.p.h. on British roads, for the followin reasons: Driving at 30 m.p.h. became a series of accelerations and decelerations, because of the frequency of cros roads and turnings, of twists in the road, of patches o bad surface, of dense traffic, and of high winds. Scener was necessarily almost forgotten, and quick wear of th transmission was evident.

It was obvious at once that lowering the road speed wa no cure without also lowering the gear ratio to avoi excessive pinking. I found 6 to 1 right for a speed o 21 or 22 m.p.h. Hill-climbing and picking up qualities wer excellent, and the engine seemed as happy as I was. could talk comfortably to my wife, look round at th scenery, pass a taxi on the level and a car on a hill. Th road seemed to be smoother, cold weather riding not s chilly, and movement of the throttle was required only t avoid revving the engine above 1,700 per minute, which, i indulged in with my particular machine, generally prevented the next stiff hill from being climbed on top. Moreover, a touch of speed came when a straight, clear, down hill run could be taken in neutral. Blind turns in th road and possible police traps ceased to worry. Th average speed *while running* still worked out at 20 m.p.h. and the petrol consumption actuall close on 100 m.p.g.

The smoother and more beautif secondary roads could be used instea of the often pot-holey main road which resemble railways and inspi one with the desire to get as quickl as possible to the end of the stretc in view. High speed in itself giv me great pleasure, but it has too man disadvantages. I do not say that never longed for a higher gear wit which to tick smoothly along the ea stretches not steep enough down f neutral. But when a 4½ or 5 to 1 t gear was in use I more often wishe for 6 to 1. This proves that t infinitely variable gear is "it."

Now, sir, "Ixion" calls himself "road incinerator," and "Chinook longs for top gears of 3½ and 4 to These gears require rich mixtures, hi speeds, and low compression engines the pink of mechanical condition sidecars are to be used in comfort, a it is then we hear about consumptio as low as 50 m.p.g.

This brings me to my suggestio which is that you should include articl by a contributor of equal experien who finds pleasure in the modern lo geared machines. The fact mention by "Chinook" that makers are n

On certain areas of the Western war zone, less well-known makes of motor cycles are used in the French Army. The photograph depicts a D.R. and his Peugeot in the district of the Vosges.

turning out machines geared lower than 5 to 1 proves that the majority of their present customers wish it. Hence this class—probably the silent majority of motor cyclists—is worth attention.

The makers could cater for both classes by providing a four-speed gear giving direct drive on the two higher ratios, such as I suppose the new 6 h.p. P. and M. has, or could have. W. R. DEUCHAR (SEC.-LT. R.E.).

THE UNITED COUNCIL.

Sir,—I write to express my opinion, as a motor cyclist, on the sentiments expressed in your leader headed "Motor Cyclists and the United Council" in your issue dated 21st February, and I support, as a member of the A.C.U., your suggestion that the A.C.U. should appoint delegates to the United Council. I maintain that motorists have not received the consideration due to them for the many sacrifices they have made in the interests of the country. Consequently I was interested in the meeting convened by Mr. Goodwin on Friday, February 1st, to discuss the position of motorists and the motor industry; and I certainly agree that *united action* is necessary. Personally I am confident in the ability of the A.C.U. officials efficiently to combat any action on the part of the United Council detrimental to motor cyclists. The possible gains are greater than the possible losses. W. WRIGHT.

CARBURETTER ADJUSTMENT.

Sir,—Being rather a Binks enthusiast, the letter in the last number of your paper from Mr. Connell has interested me. As he asks for the experience of others, I give mine.

In November, 1915, I bought a second-hand 2¾ h.p. Douglas—my first Douglas—which I still have. With the carburetter then fitted I found it impossible to get the speed to less than twenty on top, owing to worn valve guides, the back cylinder being the great offender.

In the spring of 1916 I bought a Binks, and when adjusted it gave me ten miles an hour on top gear and any reasonable speed on the main jet. As regards power, the first time I tried the Binks I climbed a local hill at twenty-five on top, which I only once had succeeded in getting up with the old carburetter without changing down.

I have now got 1916 cylinders and pistons, and the machine will do from five to forty-five on top gear. I use 000, 1, and 7 in summer and 00, 2, and 7 in winter. I have taken the cover clean off the bottom air holes, and in summer open the extra air port when using the main jet.

A friend of mine who has a 1917 3½ h.p. James has got over fifty with a Binks, and another friend over sixty on an 8 h.p. Bat-Jap o.h.v. twin with a passenger on the carrier. He also, if I remember rightly, had a No. 7 main jet.

As regards Mr. Connell's complaint of being able only to "smell" the main jet, I fancy Messrs. Binks state that the maximum power is obtained when just opening on to the main jet.

I have come across many users of these carburetters, though, strangely enough, all on twins, and the only complaints I have heard have been that they are sometimes rather hard to start, and that the controls are unwieldy and ugly. In fact, I have altered mine entirely to suit my T.T. bars, and have changed the wires over, making the control standard pattern.

One thing I have noticed in the case of people who use the Binks, and that is that they are inclined to use too large a jet. A No. 7 is usually about right for solo work under normal conditions. Anyway, of all the people I know who have used the Binks carburetter, only one rejected it, and he was a confirmed tap twiddler, who got peevish because it was not necessary to use the air lever with a normal jet setting.

I myself shall continue to use the Binks until the perfect automatic carburetter arrives, for I prefer it to any other I have ever tried. Perhaps Dr. Lindsay can throw some light on the elusive difficulty of your correspondent, as he has had plenty of experience of the Binks on the Norton.

(REV.) JOHN CONOLLY.

Sir,—In reply to H. A. Connell, I had the same trouble with a Binks carburetter for the best part of last year, and traced it to the fuels which I was using. Your correspondent can rest assured it is want of good petrol that troubles him. My machine is a 70 × 70 mm. two-stroke, and with good petrol I obtain splendid results with jets 000, 2, and 6. For well over the first half of 1917 I had to run on all kinds of substitutes, and never once could I get on to the main jet, though I tried every main jet I had or could get. Even with what I got as petrol it was the same. Latterly, while running on naphtha, or crawling rather, I thought I would try something else, so put a No. 9 main jet in the second pilot jet position and a No. 2 pilot jet in the main position; the power returned, and so did the running on the main jet. On half petrol and naphtha the jets are 000, 6, and 7; half petrol and paraffin the jets are 000, 6, and 8. No. 6 jet is really a main jet for my machine, but these were the only kind of combinations that enabled me to run on the main jet position, and with anything like power. On one occasion I got a gallon of good petrol into my tank. I think it was a mistake on the part of the dealer who sold it. Anyway, I had to change back to my old combination 000, 2, and 6. It ran splendidly all afternoon, but at 9 p.m. refused to take the main jets once more, so I changed to 000, 6, and 7, and all was well. This proved it was the fuel which was the root of the trouble, and this set me thinking many things, because there was really no economy nor yet smooth running of which to boast.

One cannot expect good results with poor fuel. With jets 000, 2, and 6 I could get a mileage of close on 100 with passenger on carrier when good petrol was obtainable, but when the main jet is in the pilot jet position the mileage shrinks down a third anyway, and the smooth running goes also. I hope my experiences will be of a little assistance to Mr. Connell. SYPHONIC.

Paisley.

MOTOR CYCLE DESIGN.

Sir,—I read with interest the short report you gave in *The Motor Cycle* for February 21st of Mr. Pendrell's paper on the above subject. He calls attention in one place to two very serious defects in design of all, or nearly all, British machines.

(1.) The method of gripping the handle-bar stem by friction of a split collar only. Many serious accidents have occurred through this idiotic design: not good enough even for a pedal cycle. Since no rider requires to revolve his handle-bars, why in the name of commonsense not make a *square* stem to the handle-bar and make it slide in a *square* socket with clip? The same applies to the seat-pillar. As no rider wants to ride with a saddle out of square, the saddle should have a square clip instead of a round one, and the saddle pin should also be square. If this were done the very frequent occurrence of a shifting saddle would be an impossibility.

With regard to the handle-bar gripping, the American machines of best makes are ahead of us, as they braze the two blades of forks on to the handle-bar, so that it is impossible for the wheel to turn without the bars turning also.

(2.) Detachable back wheel spindles. As far as I know, only the makers of the Sunbeam fit a detachable spindle with "gap piece," by removal of which the tube can easily be slipped in or out without disturbing the transmission at all.

The only alternative on other machines is to use a butt-ended tube, and this is an endless nuisance, as I know from experience.

Curiously enough, many makers use a detachable spindle for the front wheel, where it is not so necessary, as the front wheel is so easily removed, but they do not fit such a spindle to the back wheel.

Caged ball bearings (or, better, roller bearings) should be fitted to both wheels and sidecar wheel also, and the back spindle should not be less than ⅞in. diameter and the front wheel ¾in. diameter. The present wire-like spindles are a disgrace to any "engineering" firm, and have caused numberless accidents. The slight extra cost and weight of the necessary steel are not worth considering for an instant when in such vital parts of a machine as the wheel spindles.

Let us hope that after the war our leading manufacturers, at any rate, will use more intelligence in their designs than they do at present. As to British-made magnetos, I have found the C.A.V., at any rate, better than any Bosch. It is reliability itself and gives a very good spark at low speeds, hence, giving a very easy start, even on a long-stroke engine like the Norton or Rudge big singles.

Beech, Alton, Hants. M. HITCHCOCK.

[Is our correspondent unfamiliar with the A.B.C. handle-bar and the detachable wheels fitted to the Clyno, Lea-Francis, A.J.S., and other machines, which enable the rear wheel to be bodily removed in a few seconds without disturbing the transmission?—ED.]

"THE MOMAGU."

A Service Journal of a Battery of the M.M.G.S. in India.

FROM Rawalpindi, India, comes the first copy of the magazine of a battery of the Motor Machine Gun Corps, and a bright little original journal it is. The few photographs shown are entitled "Reminiscences on Tour," and depict the men of the M.M.G.S. at practice, also a mountain pass which is typical of the scenery on the N.W. Frontier. These we have taken the liberty of reproducing.

The little journal is "proprieted" and designed by Sgt. J. R. Slater, and an amusing touch is afforded in the editorial page, where it is stated that the editorial offices are situated at Sergeants' Bunk No. 2, Victoria Barracks, Rawalpindi.

The origin of the title *Momagu* is interesting. Although it has a distinctly Indian sound, it is really very British. The first two letters of the first three words in the nomenclature of the battery were taken, the result being an original and applicable title.

From the remarks of the Editor—who, by the way, is Gnr. J. T. Gough—we cull the following, which may be of interest:

"On landing at Bombay we met with the information that we had four days' railway journey to Rawalpindi. We arrived safely, but before there was time to settle down we were called out for inspection, very shortly afterwards proceeding on a tour of the N.W. Frontier.

"Probably we were of considerable interest to all Army Headquarters, as we were, and still are, the only motor unit of our kind in the country. It is surprising to think that on this particular tour we saw considerably more of the Frontier than has any other white being, with a few exceptions. Those who have enjoyed the same privilege have only been able to do so in the course of about twenty years.

"This battery, of course, is composed entirely of men who enlisted for the purpose of fighting in France, but we were sent to India; and, not knowing what to expect, we were highly pleased to receive this order.

"We have now been in the country for almost two years, and our views have undergone a considerable change. Being accustomed to receiving the best treatment in Blighty, it felt very strange to be stationed in a country where the 'duration man' is not understood. No one realises that practically ever man in Kitchener's Army has sacrifice an excellent civilian position to serv his country. We have heard of a park not a hundred miles from Calcutta where a notice once appeared to th effect that 'Dogs and soldiers are no allowed in here.' It is to the credit o the Territorials and 'duration' men tha they are living down this prejudice.

"To you at home it must be strange t know that prices of various importe stuffs have only recently increased o account of the war, and are still greatl less than the prices prevalent at home."

Scenes taken wit the *n*th Batter Motor Machine Gu Service whilst on th North West Frontie of India. This batter is the only motor un of its kind in India

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The Motorists' Protection Association.

ON Thursday, the 14th inst., the first meeting was held of the Motorists' Protection Association.

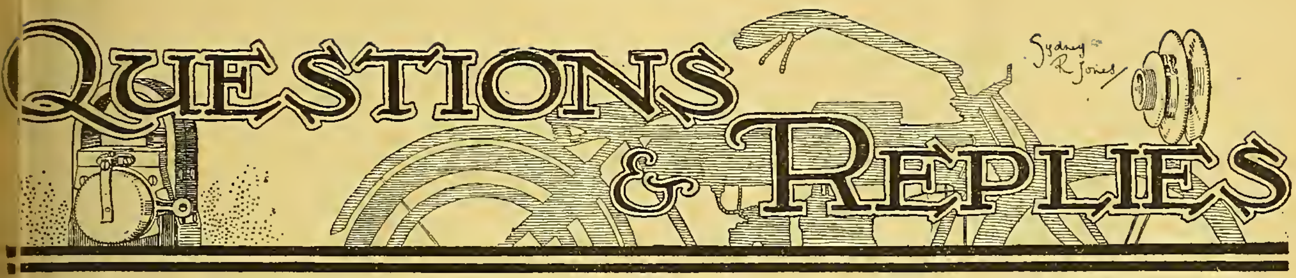
Out of the 550 motorists who had promised their support to the new organisation, only about one-tenth were present at the meeting, but, of course, it is obvious that at the present time, even more than in normal times, only a very small proportion of those willing to help and support the scheme would be in a position to attend the meeting. And, indeed, from one point of view, we think it may be taken as a good sign that so small a percentage of those who had responded were able to be present. If practically every supporter had been at the meeting, the idea would have immediately been set afoot that the body was primarily one of London motorists, and consequently would not have so much the interests of provincial users at heart as these would have every right to expect.

The name of the Association was settled upon as the Motor Users' Protection Association, and the policy or objects of the Association were handed on to a committee for investigation. These objects are:

1. To combat the anti-motor prejudice of a large section of the public press.
2. To resist excessive taxation.
3. To fight the petrol trusts and ot rings or societies which are antagoni to the interests of private motorists.
4. To take prompt action against suppression of private utility motorin
5. To prevent the imposition of reasonable restrictions in future.
6. To urge the Government to uti the revenue derived from motor ta (after the war) for its legitimate pur —that is to say, for road improvem

Any desirous of further informa should apply not to *The Motor Cycle*, to one of the two hon. secretaries, Mes H. E. Sanderson and H. E. Hayes, Su House, Howard Road, South Norwoo

QUESTIONS & REPLIES



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

A Carburetter Query.

(1.) I have a B.B. variable jet carburetter, which has been pretty reliable on a 4 h.p. single-cylinder. I have recently fitted it to a 6-7 h.p. twin. Do you hink it is suitable? (2.) I sometimes nanage to start the engine after a ouple of turns; then, after it stops and attempt to restart it, it may need a lozen turns before it will fire. (3.) Should the petrol stream through the et when it is turned on, or should the uction of the engine draw it?—P.M.D.

) If properly tuned up, the carbu-ter should be quite suitable. (2.) ficult starting may be due to the in-fer petrol that is now being supplied.) The petrol should not stream through t jet when it is turned on, and the ural level should be just below the of the jet, so that the petrol only ws when the engine is drawing in a urge.

Reducing the Compression.

I have a Rex 5-6 h.p. twin, which will not run slowly, as it is fitted with automatic inlet valves. If I put two thin brass washers at the bottom of the cylinders, vould these make the engine run more lowly and give more power? In a win-cylinder engine should the explosions follow one just after the other, r is one piston on the suction stroke when the other is on the firing stroke? f I have the carburetter touching one f the cylinders, or the petrol pipe ouching the cylinders, would this do ny harm as regards making the petrol oo hot, and would it give more miles er gallon, and make the engine more asy to throttle down?—J.F.

, the fitting of brass washers as sug-sted would reduce the compression, and, ough they might make the engine run re slowly, you would undoubtedly get s power. With regard to your second ery, this is answered in "Motor Cycles d How to Manage Them," current ition, page 46, which can be obtained m any bookstall, price 1s. 6d. When e cylinder is firing the other is drawing gas. Yes, if the carburetter is warmed would have the effect suggested. If e petrol in the pipe gets too hot it may use a vapour lock. It is, however, tter to take in the air warm than to at the fuel. We should therefore advise e fitting of a warm air intake on the es often described in *The Motor Cycle*.

Material for a Washer.

I have a small two-stroke of unknown make, in which the exhaust and induction lugs are in one casting. Please tell me the best material to make the joint between lug and cylinder. It will have to stand the heat of the exhaust and yet make an airtight joint for the induction system.—R.L.B.

We should say that the best washer would be one made of copper and asbestos.

Use of Petrol.

I have a motor car, for which I am allowed ten gallons of petrol per month. Should I be allowed to run my motor cycle on a quantity of the petrol, or is it necessary to obtain a separate petrol permit? The motor cycle would be used for just the same purpose as the car.—B.K.

To be quite on the safe side, it would be as well for you to communicate with the Petrol Control Department, and to inform them that you propose, with their consent, to use a certain amount of the motor spirit purchased on your licence for a motor cycle. The Department will have no objection to this course being adopted, but a letter from them stating that you may use the spirit on a motor cycle might be of use in the event of your being stopped and interrogated by an exceptionally conscientious police constable. We assume, of course, that your present licence is of the full-duty variety.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

THE NEED FOR ECONOMY.

Owing to the present drastic restrictions on the import of paper, the most rigid economy is necessary, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week, thus avoiding chance buying, which may lead to wastage owing to copies being left unsold.

Controlling the Fixed Air Supply.

I am in possession of all three of your books—"Hints and Tips," "Tracing Troubles," and "Motor Cycles and How to Manage Them"—from which I have derived a great deal of useful and valuable information. I also receive my copy of *The Motor Cycle* regularly. I have latterly been experiencing some starting difficulty with my 3½ h.p. B.S.A., and on covering the air intake I find I can start up quite easily. My carburetter is a 1912 B. and B., and I believe my trouble is identical with "Road Rider's" as described in paragraph 210 in "Hints and Tips," and I want to know where I can obtain such a device as is referred to for varying the amount of opening of the air intake.—J.W.

We do not know of any such device on the market at the present time. It would be possible, however, to make or adapt one. A second-hand diaphragm pattern photographic stop would do admirably for this purpose.

A Stuck Piston.

Owing to the petrol restrictions I have had to put my machine away, and I omitted to inject any petrol in the cylinders to prevent the pistons from gumming up. I eventually found that I was unable to turn the engine, so I think it is gummed up. Will you please tell me the best and easiest way to get it in working order again? The machine is a new one—1917 5-6 h.p. twin three-speed Ariel, countershaft gear model. How many miles per tankful of petrol should I get out of it? The tank holds 1⅝ gallons, and having a No. 28 jet in, I am able to get about seventy-four miles on this with sidecar.—W.H.W.

The engine is probably gummed up, and your best plan will be to put a little paraffin in the cylinders (not petrol), leave it standing all night, and then attempt to rotate the engine. Having done that, if you have any petrol left, start up the engine and lubricate it generously. This will adequately lubricate the cylinder walls, and the engine should be then efficiently protected from rust for some time to come. Of course, if it is very badly stuck up, the cylinder will have to be removed. Your consumption is certainly inferior to the average. You ought to obtain about ninety-five miles to the tankful.

Crank Case Oil Level.

Whilst reading the article by "Chinook" in *The Motor Cycle*, my interest in lubrication was aroused, and I should be very much interested to know the oil level and exactly how much oil my crank case contains under normal circumstances. My machine (a 4-5 h.p. Zenith) is fitted with semi-automatic lubrication and a hand pump in case of emergency. What I should like to know is whether there is any objection to my drilling and tapping the crank case and fitting a gauge similar to that fitted to a very popular four-cylinder two-speed American car.—E.H.

If you wish to know the approximate quantity of oil your crank case contains, you should lubricate the engine to a normal extent, and after a short run open the drain tap, measure the oil which drains out, and this will give you an approximate idea. The difficulty is that motor cycle oil is rather thick, and consequently you will not drain it all out, as some adheres to the flywheels, the cylinder walls, sides of the crank case, etc. The only good method of ascertaining the oil level would be to fit a glass window in the crank case, as is found in the Indian, F.N., and other motor bicycles. Such a gauge or window could be fitted to the crank case without much difficulty. You would have to fit a brass disc, which would be a proper machined fit against the crank case, thread the interior rim, and screw in a thick glass in a brass frame, the edge of which is threaded, about the size of a small watch dial—that is to say, if you cannot buy a window, and this, we fear, would be rather difficult at the present time.

A Steam Motor Bicycle.

(1.) Are there any disadvantages in using steam for motive power on a motor cycle, using a flash boiler? (2.) I want to use a three-cylinder single-acting engine to develop 6 h.p. at the wheels, geared 4 to 1 from the engine. Can you give me the bore and stroke? (3.) Can I get 200 lb. pressure with a flash boiler using a paraffin blowlamp? Is this suitable for such an engine? (4.) Will you please refer me to any design of a steam-propelled motor cycle in any back number of *The Motor Cycle*? (5.) What type of valves would be suitable; I want to get a speed of about thirty-five to forty miles per hour?—F.S.

(1.) The general difficulties are the provision of a proper boiler and a suitable burner, also the storage of an adequate water supply without increasing the weight unduly. (2.) Assuming that the pressure is 200 lb. per square inch, and that when giving off this horse-power the mean effective cylinder pressure will amount to threequarters of the boiler pressure, three cylinders 2 × 2in. would suffice; 1⅞in. bore by 2¼in. stroke would probably give better proportions, however. It is doubtful whether such a mean effective pressure could be maintained, and, therefore, rather larger cylinders might be advocated. (3.) You ought to be able easily to get 200 lb. pressure. Flash boilers can work up to 600-900 lb. per square inch pressure. (4.) *The Motor Cycle* of November 29th, 1917, contained a description of a steam motor cycle. (5.) For the high temperature, high pressure steam of a flash boiler, poppet valves are the only ones possible.

Hints on Driving.

Before the restrictions in the use of petrol came into force, I was a learner on a 2½ h.p. Jap-engined New Imperial. As I am seventy years of age, I should like to know if I injure the machine by running principally on the low gear? I am now residing in the country, where there is little or no traffic, so have a good opportunity to learn.—W.K.

We should recommend you not to run the machine on the low gear longer than you can help, as this causes excessive wear on the engine and overheating. We should advise you, therefore, to change into top speed as soon as you can. and then, if you wish to run slowly, throttle the engine down. You will soon learn how to do this after a little practice.

Petrol Again.

I noticed in *The Motor Cycle* some time ago that "permits may be granted to soldiers on leave from Active Service." Does that mean that we only require to ask the Superintendent of Police and we get one? Also I have a 1913 Matchless, and intend getting a newer machine. Is it necessary to have a licence to exchange or buy a new one? I have been in France for three years and have lost touch with all these matters.—I.T.

You will have to write to the Petrol Controller, 19, Berkeley Street, placing the full circumstances of the case before him. If you cannot write at least three weeks before you intend to come home on leave you should notify the Controller of your intention to call for the licence on a certain date. It is impossible to buy a new motor cycle from the makers without a Class A certificate, which may be obtained under certain circumstances from the Priority Branch, Ministry of Munitions, Whitehall Place, London, S.W. If a dealer has a new machine in his stoc which was purchased before the restric tions came into force he may sell thi machine without demanding a Class certificate from the purchaser. No licen is necessary for the purchase of a secon hand machine.

READER'S REPLY.

Scott Queries.

Referring to "C.P.A.'s" Scott queri in your issue of March 14th, my exper ence is that, for ease of starting fro cold, one or more injections of petr (or preferably ether) into the inductio pipe are usually indispensable. As Binks carburetter levers, the air lev should be closed and the throttle abo one-third open. With regard to t magneto, to test the timing according the makers' instructions, remove t sparking plug from the left-hand cyli der, and turn over engine until t piston is seen to be at the top of stroke. Now fully retard the igniti by rotating the contact breaker cov anti-clockwise, when the points should just separating with the fibre block the bell crank lever at the lower end the right-hand segment. If "C.P.A has further trouble with his Scott, a likes to communicate with me, I sh be glad to help him.—1914 SCOTT.

EXPERIENCES WANTED.

N.A. (Oakham).—4 h.p. A.J.S. fit with Amac or Binks carburetter. C sumption, speed, and hill-climbing ca bilities.

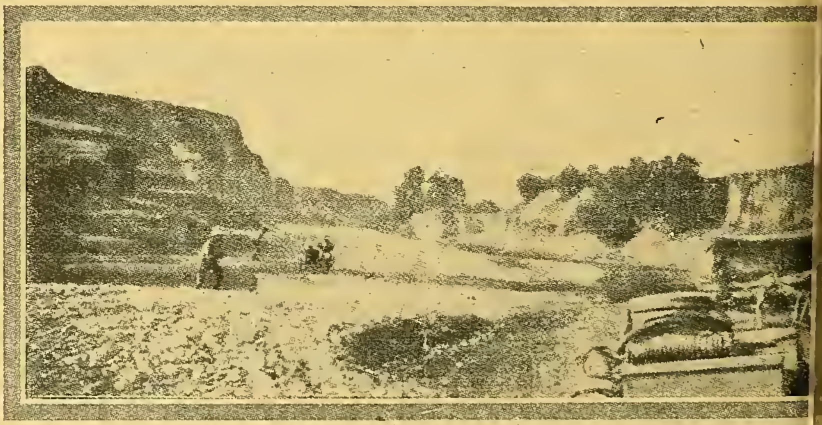
RECOMMENDED ROUTES.

HOLMFIRTH TO COLWYN BAY.—M.S.

Holmfirth, Woodhead, Stockpo Northwich, Chester, Flint, Prestat Rhuddlan, Abergele, Colwyn Bay.

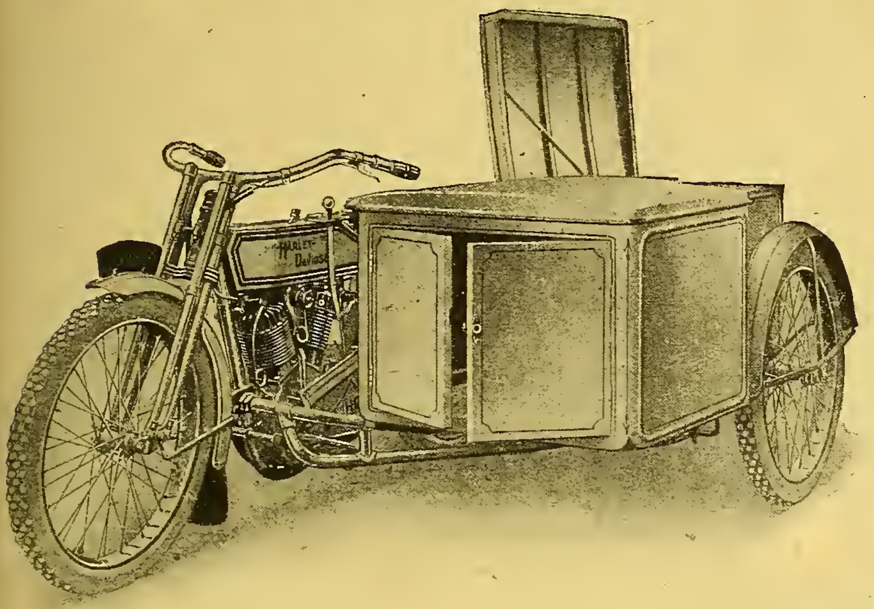
AMBLESIDE TO WANTAGE.—J.E.S.

Ambleside, Kendal, Lancaster, Prest Wigan, Warrington, Tarporley, Na wich, Stafford, Gailey Cross Roads, t to left along Watling Street, left at f Brownhills (avoid Walsall and Canno Castle Bromwich, Stonebridge, Ke worth, Warwick, Banbury, Oxf Wantage.



With the M.M.G.S. on the North-West Frontier of India. The machine gun outfits frequently encountered deep river beds, through which it was no light task to steer a heavy sidecar. (See page 310.)

HARLEY-DAVIDSON



COMMERCIAL CARRIERS.

We still have a few commercial bodies only in stock, suitable for butchers, bakers, grocers, etc. Can be fitted to most makes of chassis.

Full particulars on application.

74, NEWMAN ST.,
LONDON, W.1.

WHEN . . .

PEACE IS IN SIGHT

We shall be pleased to have your enquiries for the post-war

HOBART MOTOR BICYCLE.

The experience obtained in war will be a big factor in perfecting our new models, and will further enhance the already high reputation of

HOBART MOTOR BICYCLES.

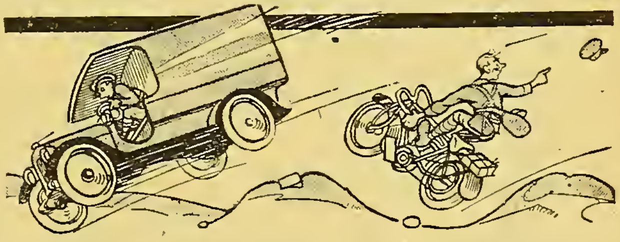
Remember, we are one of the oldest manufacturers of motor bicycles.

BUSINESS ESTABLISHED 1884.

Hobart Bird & Co., Ltd.,
Hobart Works,
Coventry,
England.

Telegrams:
"Hobart,
Coventry."

HOBART



Bad road surfaces, no matter how treacherous, have no terrors for users of

BELDAM

All-British Tyres

The Beldam V Steel-studded Motor Cycle Tyre, with its combination tread of steel and rubber—steel studs indented and flush with the face of the rubber—grips on snow, slime, and frost-bound surfaces. Beldam Tyres engage the road at once. Wheels do not spin when starting, and the grip is never relaxed however the road surface may change. Other Beldam advantages are long mileage (due to the quality of materials used and the deep tread) and antipathy to cuts and punctures—as hundreds of Beldam users testify. May we send you complete lists of sizes and prices?

The Beldam Tyre Co., Ltd., Brentford, Middlesex

Godbolds.

A new Line from Leicester

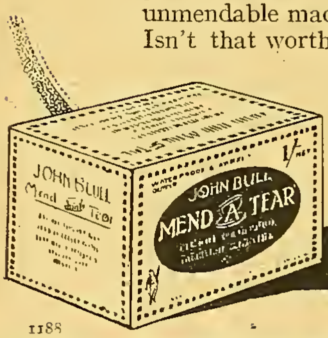
Just a wonderful new material with

Mend a Tear

A material that will repair successfully almost any article of clothing and best of all

Mend without Stitches

Just the line in these days of difficult supplies. Even the hitherto unmendable mackintosh can be repaired with it and will look like new. Isn't that worth testing? If you think so, send us a penny stamped addressed envelope and we will post free sample per return.



LEICESTER RUBBER CO., LTD.,
Makers of the famous John Bull
motor cycle and cycle tyres,
10, Granby Works, Leicester.

1188

OWING to the factory being engaged on Government work, we are still unable to supply for civil requirements, but it would pay you to keep in touch with us. Let us record your address for new list when ready.

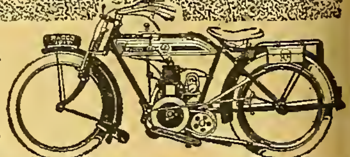
Our post-war programme provides for a New Colonial and Sidecar 6 h.p. Twin Model with spring frame. Also Overseas Engines and Complete Sets of Fittings for the Home and Export Trade.

THE OVERSEAS MOTOR CO., LTD., 1a, Johnstone Street, Ladywood,
BIRMINGHAM.

Radco

THE KING OF LIGHTWEIGHTS.

The Example of Perfection
IN LIGHTWEIGHT DESIGN.
Write for Illustrated Booklet showing Latest Improvements.
E. A. RADNALL & CO., DARTMOUTH ST., BIRMINGHAM.



ALBION

GEARS FOR

LIGHTWEIGHTS.

ALBION ENGINEERING CO., LTD.,
Upper Highgate St., BIRMINGHAM.

Agricultural Gazette 1D

Established 1844.

UNDER NEW OWNERSHIP.

Enlarged, well illustrated, and dealing thoroughly with

MOTOR MACHINERY FOR FARM WORK

and all other aspects of modern farming.

Every Tuesday. **1d.** Of all Newsagents.

Write for a specimen copy to—
ILIFFE & SONS LTD., 20, Tudor St., London, E.C.4

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PRICES.

DVERTISEMENTS in these columns rst 12 words or less 1/6, and 3d. for every words after. Each paragraph is charged rately. Name and address must be counted. s discounts, conditions, and special terms gular trade advertisers will be quoted on cation.

stal Orders sent in payment for adver- ents should be made payable to FE & SONS Ltd., and crossed & Co.

advertisements in this section should be mpanied with remittance, and be addressed e offices of "The Motor Cycle," Hertford l, Coventry. To ensure insertion letters ld be posted in time to reach the offices of e Motor Cycle," Coventry, or London (20, r St., E.C.4), by the first post on Friday ing previous to the day of issue.

l letters relating to advertisements should e the number which is printed at the end of advertisement, and the date of the issue hich it appeared.

e proprietors are not responsible for clerical rinters' errors, although every care is taken void mistakes.

NUMBERED ADDRESSES.

the convenience of advertisers, letters may be ssed to numbers at "The Motor Cycle" Office. this is desired, the sum of 6d. to defray the cost of ration and to cover postage on replies must be added advertisement charge. Only the number will appear e advertisement. All replies should be addressed 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

sons who hesitate to send money to unknown persons deal in perfect safety by availing themselves of our sit System. If the money be deposited with "The r Cycle," both parties are advised of this receipt.

e time allowed for a decision after receipt of the is three days, and if a sale is effected we remit the ot to the seller, but if not we return the amount e depositor, and each party to the transaction pays ge one way. For all transactions exceeding £10 in a deposit fee of 2s. 6d. is charged; when under he fee is 1s. All deposit matters are dealt with at ntry, and cheques and money orders should be made ble to Iliffe & Sons Limited.

e letter "D" at the end of an advertisement is an ation that the advertiser is willing to avail himself of Deposit System. Other advertisers may be equally ous, but have not advised us to that effect.

SPECIAL NOTE.

eaders who reply to advertisements and receive no er to their enquiries are requested to regard the e as an indication that the goods advertised have dy been disposed of. Advertisers often receive so enquiries that it is quite impossible to reply to each by post.

MOTOR CYCLES FOR SALE.

A.J.S.

J.S. 6h.p. Latest Model in stock.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [X2778

.S Spares: prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

J.S., 1914, 6h.p., and coach sidecar; £68/10.—Motor Exchange, Horton St., Halifax. [4209

J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Bath Rd., Exeter. [3520

16 4h.p. A.J.S., No. 8,078, with luxurious coach-built sidecar, spare wheel and tyre, hood, screen, mp sets, mechanical horn, Cowey speedometer, set , perfect order throughout; £85.—Robinson's Gar- Green St., Cambridge. [4128

J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; 6; trade supplied; no permits required.—P. J. ns, sole agent for Birmingham and district, 87-91, Bright St., Birmingham. [3711

J.S., 6h.p., and sidecar, with wind screen, lamp, and horn; this is one of the latest 1915 models turned as it left the works in October, 1915. The outfit been thoroughly overhauled and revarnished, and ractically equal to new in every possible respect; e only £75.—Julian, 84, Broad St., Reading. gest light car and motor cycle dealer in the South. one: 1024. Closed Wednesdays 1 o'clock. [0735

OVER 100

—comprise my stock of Lightweight, Solo, and Passenger motor cycles—all "leaders" in Britain's Best makes, to suit all purposes. Here's a few you should investigate without delay:—

A.J.S., 6 h.p., Military model	£81 6
Connaught, 2¾ h.p., 2-stroke	28 17 6
Enfield, 2¼ h.p., 2-speed, 2-stroke	50 gns.
Enfield, 3 h.p., twin, 2-speed	66 gns.
Enfield Combination	110 gns.
James, 4¼ h.p., 3-speed	£79 0
James, 3½ h.p., 3-speed, twin	79 0
James, 6 h.p., 3-speed, kick-start	84 0
New Imperial, 2¾ h.p., 2-speed	40 19
New Imperial, 2¾ h.p., clutch	48 6
Norton, 1917, special, 4 h.p., 3-speed	75 gns.
Rover, 3½ h.p., countershaft, 3-speed	£80 0
Rover, 3½ h.p., T.T.	62 10
Rover, 5 6 h.p. Twin	97 10
Rover, 5-6 h.p. Twin, with coach-built Sidecar	124 5
Calthorpe-Jap, 2-speed	39 18
Calthorpe, 2-stroke, 2-speed	34 gns.

Particularly note that, in purchasing any of these—

No Permits are required.

And also that

I can supply the Trade on extremely liberal terms

IMMEDIATE DELIVERY given of any from the following popular models:—

12 A.J.S.'s, 12 JAMES's, 20 NEW IMPERIALS, 30 CALTHORPES, 12 ROVERS; also

Connaughts, Enfields, Hockleys, etc.

LIGHT CAR buyers, too, will find it impossible to equal a choice from MY two up-to-date models:—

PERRY & CALTHORPE.

Why not get in touch at once with

P.J.EVANS

87-91, John Bright St., B'ham.

"GRADO" MULTI-PULLEY.

Though on Munition work, we can supply from stock. See our previous advts.

GRADO MFG. CO.
142, Hurst Street,
BIRMINGHAM.

For Triumphs, Bradburys, etc. **£3 : 13 : 0**
Ball Thrust, **£4 : 0 : 0**
Lightweight, **£2 : 10 : 0**
Recessed pulley, **10/-** extra.

DELIVERIES: FROM STOCK.

'Hints and Tips for Motor Cyclists.'

Brimful of useful information.

Price 1/6 By post 1/8
Home or abroad.

ILIFFE & SONS LTD., 20, Tudor St., E.C.4.

IMPORTANT NOTICE.

Owing to the Easter Holidays, the issue of "The Motor Cycle" for April 4th, must be closed for press earlier than usual. All copy and instructions for Miscellaneous Advertisements in that issue must, therefore, be in our hands not later than first post on Thursday, March 28th.

DEFENCE OF THE REALM ACT

Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

Alldays.

ALLON, 2¾h.p., single, £38, new; 2-speed, £45, new; 2-speed and hand clutch, £48, new; 2-speed, £28/10; E.P., or exchange.—Service Co., 292, High Holborn, London. [X3021

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-speed countershaft models in stock. [1048

GENUINE Bargain.—Brand new Ariel combination, 3½h.p., only done few miles; £85, or nearest cash offer.—Box 1,793, c/o *The Motor Cycle.* [X2799

Auto-Wheels.

AUTO-WHEEL and B.S.A. Auto-Wheel bicycle, perfect condition; no petrol; £15.—Hucklebridge, 133, Sloane St., London, S.W.1. [X3001

Bradbury.

BRADBURY, 1912-13, 3½h.p., 3 speeds, with coach sidecar, £32/10; 1913 3½h.p., 3-speed model, £29/10.—Motor Exchange, Horton St., Halifax. [4210

BRADBURY, 1914, 4h.p., 2 speeds, speedometer, P. and H. lamps, tools, Canoelet coachbuilt sidecar, splendid condition; £32.—96, Lea Bridge Rd., Clapton, E.5. [4195

Brough.

BROUGH, 1915, 3½h.p., 2-speed countershaft, £42/15; 1916, 3-speed Sturmey-Archer countershaft, kick starter, hand clutch, P. and H. head and rear lamp, horn, Stewart speedometer, etc., £55, or with Watsonian sidecar, £65/10; E.P., or exchange.—Service Co., 292, High Holborn, London. [X3022

B.S.A

B.S.A., 1915 model, 3-speed countershaft gear, free engine and kick starter, fitted with all accessories, and ready for the road, and guaranteed; 50 gns.—Seen at Wauchope's, 9, Shoe Lane, London. [4250

1915 4¼h.p. B.S.A., 3-speed countershaft gear, chain driven, perfect order, Lucas lamps and horn, fitted gas container on carrier; £52.—Apply by letter, Barnard, Comiston, Cambridge Rd., Linthorpe, Middlesbrough. [X2948

Calcott

CALCOTT, 1914, 2½h.p., good condition; £12.—Ward-Davies, Llanion Terrace, Pembroke Dock. [X2992

Calthorpe.

1915 Calthorpe-Jap, 2¾h.p., Enfield 2-speed, in almost brand new condition; bargain, £24.—Chalkley, The Broadway, New Southgate. [4205

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [3713

MOTOR CYCLES FOR SALE.

Clyno.

1916 Clyno Combination, £75, 6h.p., condition as new, only done 3,000 miles.—P. Collyer, Peppering, Arundel, Sussex. [4198

CLYNO 1914-15 Model Combination, 5-6h.p., 3 speeds, free engine, kick starting, spare wheel and tyre, detachable wheels throughout, all accessories included, also hood and screen; extended payments arranged, or exchange.—Wanchope's, 9, Shoe Lane, London. [4251

Diamond.

DIAMOND, 1913, countershaft 2-speed gear, chain drive; £25/10.—Motor Exchange, Horton St., Halifax. [4211

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

1914 2¾h.p. Douglas, T.T. Model, 2-speed gear; £25; bargain.—At Wauchope's, 9, Shoe Lane, London. [4252

DOUGLAS, 1912, clutch, 2-speed, lamp, horn, spring seat-pillar; £25.—Clark Bros., Killeshandra, Co. Cavan. [X2996

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50. [5855

DOUGLAS, 1912, gears, clutch, Cowey speedometer, all accessories, perfect condition; £28.—Mariland, Hill Cottage, Cobham, Surrey. [4176

DOUGLAS, 1911, engine overhauled by makers, tyres sound, excellent condition, new Dunlop belt; £14.—Box L5,806, c/o *The Motor Cycle.* [4049

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

DOUGLAS, 1913, 2-speed, Bosch mag., £32/10; Model V, practically new, issued late 1917, £55; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X3014

DOUGLAS, 1914, new black stoved, 2-cyl., 2-stroke, 2¾h.p., new tyres, tubes, lamps, horn, all as new; £40; fastest Douglas on road, perfect.—Fulton, Woodlands, Burnley. [X3000

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1912 single speed, £15/10; 1913 2-speed, £31/10; 1914 2 speeds, £34/10.—Motor Exchange, Horton St., Halifax. [4212

LATEST 2¾h.p. W. Douglas, brand new, with the new pattern hand-controlled clutch, the latest front forks, and many other improvements, £54, plus 20%; also U. and V. models, 1916 specification, £50, plus 10%; absolutely new; immediate delivery against priority permits for doctors, farmers, war and munitions workers.—How and where to apply, full particulars, write Douglas Specialists, Robinson's Garage, Green St., Cambridge [4129

Enfield.

ENFIELD Twin, 2¾h.p., 2 speeds; £30.—Robinson, Magherabeg House, Donegal. [4194

1917 Royal Enfield Combination; offers.—At Wauchope's, 9, Shoe Lane, London. [4243

ENFIELD, 2¾h.p., 2-stroke, 2-speed, 1916, good condition; £30.—Wylie, Frating House, Grays. [X3003

ENFIELD 6h.p. 1916 Combination, in new condition, not ridden last 12 months; owner on draft; £65.—Kent, 35, Dunning St., Sunderland. [X3002

1913 Royal Enfield Combination, 6h.p., 2-speed; full particulars, stamp.—George Swift, Commercial Rd., Skelmanthorpe, near Huddersfield. [4186

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

ENFIELD 1914 6h.p. 2-speed Coach Combination, in fine order, £62/10; 1915 model, £72/10; 1916, £82/10.—Motor Exchange, Horton St., Halifax. [4213

3½h.p. Royal Enfield, Nov., 1916, with Watsonian sidecar, in perfect condition; £50, or exchange higher power.—Box L5,841, c/o *The Motor Cycle.* [4184

1914 6h.p. Enfield Combination, 3 lamps, horn, speedometer, splendid condition and perfect running order; £55.—Waite, Park Av., Northampton. [X2975

ROYAL Enfield 6h.p. Combination, splendid running order, wicker sidecar, 2 lamps, 2 spare tubes, 3 new tyres, new chains, all accessories; what offers?—Deep Cut Dairy, Bramshott, Hants. [4197

1914-15 6h.p. Royal Enfield Combination, coachbuilt sidecar, includes all accessories, nice, sound mechanical condition; £55, genuine bargain, and guaranteed.—Wanchope's, 9, Shoe Lane, London. [4242

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X3018

ROYAL Enfield, 1915, 6h.p., 2-speed, coach combination, 3 new lamps and new oversize combination, Palmer cord tyre to driving wheel, splendid condition; £82/10.—Pullings Garage, London Rd., West Croydon. 'Phone: 1619 Croydon. [4192

RIDER TROWARD and Co., 31, 40b, 78, High St., Hampstead.—1917 Enfield standard combination, hood, screen, 77 gns.; 1916 standard Enfield combination, 72 gns.; 1917 3h.p. twin Enfield, as new, 44 gns.; 1915 3h.p. twin Enfield, 32 gns. (D) [4076

GET IT AT Taylor's

IN DIFFICULT TIMES.

If you are requiring a Motor Cycle or Combination for immediate use write for our list of machines available.

SPARE PARTS.—We carry a good assorted stock for most makes.

CLOTHING.—Oilskins, Waders, Waterproof Gloves, Leather Waistcoats in stock.

ACCESSORIES. Lamps (electric and gas), Horns, Speedometers, etc., in stock. Flashlamps and Batteries from stock.

THIS WEEK'S SPECIAL OFFER.

Late 1917 7-9 h.p. 17J HARLEY-DAVIDSON Combination, special finish, electric equipment, speedometer, watch, electric lamp to sidecar, all in beautiful condition. Price £112 10

THE "MARVEL" STEAM VULCANIZER for expert or novice. Never fails.

Motor Cycle size	13/9
Car size	25/-

Carr. paid. 10 days' free trial. Write for leaflet.

Sole London Agents for **A.J.S.** and **EXCELSIORS.**
Sole District Agents for **CALTHORPES.**

H. TAYLOR & CO., LTD.
Showrooms: 21a, STORE STREET, W.C.1.
Wholesale: 38, ALFRED PLACE, W.C.1.
Garage: Tottenham Mews. 'Phone—Museum, 1240.
Telegrams—"Dynametro, Westcent, London."

ONE POUND
UNITED KINGDOM of GREAT BRITAIN AND IRELAND
No 093145
DRUID
R.H.S.

Lessened Wear & Tear saves money on every ride—ensuring maximum service. But, to afford this, your mount must embody the

DRUID Mark II.

Spring Fork—which, by alone totally absorbing all shocks, will successfully promote that greater wheel-ease you desire after the war.

A. DREW & CO., Limited
Leopold Street,
BIRMINGHAM

Made in 3 models for Solo or Sidecar.

MOTOR CYCLES FOR SALE.

Harley-Davidson.

HARLEY-DAVIDSON Combination for sale, sidecar and tyres, less lighting; £57.—E.H., Seely Rd., Tooting.

1917 Harley-Davidson, practically new, lamp, mechanical horn, 7-9h.p., no sidecar; price £ Humphreys, Union, Limerick. [X

1917 Harley-Davidson Combination, mag. m lamps, horn, new condition; £115.—Elce Co., 15-16, Bishopsgate Av., Camomile St., E.C.3.

7-9h.p. Harley-Davidson Combination, Phœnix c built sidecar, newly enamelled and overhau bargain, £70.—Beaumont, 59, Halstead Rd., Enfie

RIDER TROWARD and Co., 31, 40b, 78, High Hampstead.—1915 Harley-Davidson, dynamo ing combination, 65 gns.; T.T. Harley, 7-9h.p., 3-s disc wheels, clutch, kick start, dynamo lighting, green finish, 65 gns. (D)

HARLEY-DAVIDSON Combination, 1915, el cally equipped, converted to manual switch, s ometer, tyres good, not much used, in very good dition; owner serving.—On view Parkfield Engine Works, Perry Vale, Forest Hill.

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. e 3-speed, clutch, and K.S., lamps, speedor special sidecar; £65; E.P. or exchange.—Service 292, High Holborn, W.C.1. [X

HAZLEWOOD 5-6h.p. Combination, J.A.P. e 3 speeds, countershaft gear, clutch, and kick s and free engine, all accessories, complete, includes some coachbuilt sidecar; price £47/10 the combin —At Wauchope's, 9, Shoe Lane, London.

Humber.

HUMBER, 1912, 3½h.p., 2 speeds, handle sta £18/10.—Motor Exchange, Horton St., H

Indian.

LATE 1915 7-9h.p. Indian, 3-speed, foot and controlled clutch; bargain, 39 gns.—Cl (Motors), 119, King George St., Greenwich.

INDIAN, 5-6h.p., 1915, 3 speeds, clutch, lamp horn, ridden 1,000 miles, perfect condition, tyres; £40, or nearest offer.—Box L5,805, c/ *Motor Cycle.*

INDIAN, 4h.p., 2 speeds, £22/10; 7-9h.p., fr gine, twin, £23/10; 1914 7-9h.p., 2-speed, frame, Millford sidecar, £49/10.—Motor Exchange ton St., Halifax.

INDIAN, 1915, 7-9h.p., 3-speed, spring fram Swan coach sporting sidecar, discs all wheels plete with lamps and mechanical horn; £60, or car chassis part exchange.—Lamb, 5, Latham Gomersal, near Leeds.

RIDER TROWARD and Co., 31, 40b, 78, Hi Hampstead.—1916 Powerplus Indian, 3 clutch, kick start, 59 gns.; 1916 T.T. 7-9h.p. model Indian, 42 gns.; 1915 7-9h.p. 3-speed combination, disc wheels, 57 gns.; 1915 T.T. Indian, 37 gns.; 1914 T.T. clutch Indian, 29 g

James.

JAMES, all new models; extended payments change.—Service Co., 292, High Holborn, W.C.1.

Levis

LEVIS 2¼h.p. Popular Model, semi T.T. bar pletely overhauled, and guaranteed; £20. chope's, 9, Shoe Lane, London.

Lincoln-Elk.

LINCOLN-ELK, 1914, 6h.p., countershaft ge and chain drive, underslung coach sidecar; Motor Exchange, Horton St., Halifax.

Matchless.

1914 Matchless and Sidecar, very fine conditi dealers; £40, lowest.—Seen Fulham Palace, North End Road.

MATCHLESS Latest War Model Combinatio plete with detachable wheels, spare wheel an £120.—Exeter Motor Cycle Co., Ltd., Bath Rd.,

7h.p. Matchless Sidecar Outfit, complete with cessories, M.A.G. engine; offers wanted; in at any time.—Grose, Ltd., Marefair, Northam

MATCHLESS 8h.p. Combination, new, fitt J.A.P. or M.A.G. engines; extended paym exchanges.—Service Co., 292, High Holborn, W.C.1.

MATCHLESS Combination, 1913, 6h.p. J.A. chine and tyres in excellent condition; £ exchange cycle or lightweight.—Box L5,836, *Motor Cycle.*

7-9h.p. Matchless Combination, only ridden miles, late 1914, latest type sidecar (new ometer, and all accessories, with box attachment in 8 minutes), suitable for baker or butcher. Baker, 70, High St., Lewisham, S.E.

New Hudson.

3½h.p. New Hudson, £15; also a 6h.p. com 1916 model, 3 speeds, £65, bargains.— chope's, 9, Shoe Lane, London.

THE MOTOR CYCLE
ESTABLISHED IN 1903
A posse ad esse
AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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Driving Examinations and Certificates.

A CORRESPONDENT wrote to *The Motor Cycle* recently asking if it were not possible for him to obtain a driving certificate which would show that he was capable of driving a motor bicycle and had some knowledge of the theory of its working. The reason for this was that he had applied at a recruiting office to be enrolled as a despatch rider, and the officer in charge told him that he would do his best to put his case forward, provided he could bring some proof that he was a capable driver and had a good knowledge of motor bicycles. We were reluctantly compelled to tell him that no such certificate existed.

The car driver has no difficulties in this respect. There is the R.A.C. driving certificate, the examinations for which are extremely popular at the present time. The Royal Automobile Club is doing very useful work in holding these examinations daily. All sorts and conditions of both men and women go in for them. The examinations are divided into classes, for the first, second, third, and owner-driver certificates, the difficulty of the test being in proportion to the type of certificate for which the candidate enters. The examinations consist of a short but stiff driving examination, and for the first and second-class certificates a technical paper has to be passed.

It should not be beyond the powers of the Auto Cycle Union to institute something rather similar for motor cyclists. With the motor cycle, however, there is this difficulty, a solo machine cannot be very well observed, and this fact has certainly militated against the solo machine entering for certified trials. With the sidecar machine, on the other hand, the examiner can easily accompany the driver, but, of course, in the case of a solo machine it would be necessary for the examiner to ride in close company with the candidate on another motor cycle.

It would certainly be worth while for the Auto Cycle Union to adopt examinations of this kind, as the certificates, when procured, would be a valuable asset to the candidate should he desire to obtain employment as a motor cyclist either in the Army or in a civilian capacity. The attention of the Auto Cycle Union has been called to the matter in question, and we understand that it is receiving consideration.

Easier Decarbonisation.

ONE of the weaknesses of the air-cooled engine is that it requires to be much more frequently decarbonised than one which is water-cooled, and, furthermore, the carbon deposit in the case of an air-cooled engine is much harder and more difficult to remove than in the case of the water-cooled engine. The result is that the skilful owner-driver of a car can always make a fairly easy job of decarbonisation by scraping out the deposit through the valve ports.

Now in the case of a motor cycle engine there are two difficulties: one is the restricted area of the valve ports, which renders it difficult to get in a suitable tool, and the other is the fact above mentioned, that the carbon deposit is very much harder. The ordinary process of removing the cylinder is, of course, the most satisfactory method, but it requires a good deal of labour. On the other hand, the scraping process, though it cannot result in such a complete cleaning of the piston and combustion head, is quite satisfactory if carefully carried out at the necessary intervals, and renders the removal of the cylinder only essential about once or twice a year.

Many motor car manufacturers have realised that facilities for the scraping process are desirable features, and have, in consequence, fitted ports with detachable covers in the cylinders, through which scraping tools can be easily inserted. That is a point in design which we think motor cycle engine designers may well adopt.

An index to the advertisements in this issue will be found on the page facing the back cover

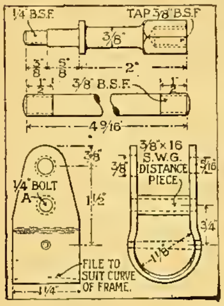
IDEAS: Useful and Ingenious.

Readers of "The Motor Cycle" are invited to contribute to this page any ideas successfully adapted to their motor cycles. Contributions will be paid for at our usual rates. Rough sketches will suffice.

ALTERING THE SADDLE POSITION ON A DOUGLAS.

THE sketch shows an altered method of fixing the saddle on a $2\frac{3}{4}$ h.p. Douglas 1915 model.

The saddle position, in relation to the footrests and handle-bars, on the machine as it was handed over to me was most uncomfortable. I was seated too far back, and the saddle was just too high from the ground to enable me to paddle off on anything but a slight down grade.

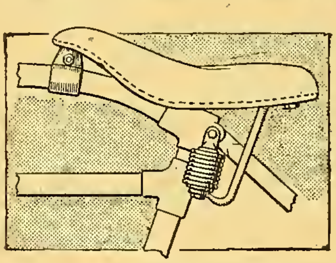


Dimensions of the parts needed for the alteration to saddle fixing of a Douglas.

The saddle clip was fixed on a straight tube—an extension of the rear frame tube, in fact—and although I could have moved the saddle forward by making a special pin, yet this would have been at the cost of increasing its height from the ground, which I was determined not to do.

I finally decided to alter entirely the method of fixing the saddle, to scrap the usual underframe, and attach the nose of the pressed steel frame of the saddle directly to a special clip located on the top tube of the machine and support the springs on extensions of a special seat-pillar bolt.

The result has entirely justified the trouble, and now the top of the saddle is only $28\frac{1}{2}$in. from the ground, and I can paddle off in comfort. In addition, I sit sufficiently far forward for some of my weight to be taken on the footrests, which, with a lightweight on a pot-holey road, means much easier riding.



Showing the alteration effected and the fitting of the clip.

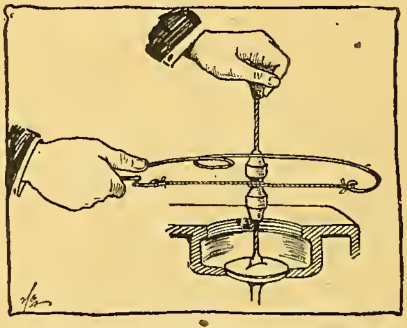
I see from recent illustrations in *The Motor Cycle* that an identical scheme is embodied on the 1918 model Douglas.

The dimensioned sketches show the actual new parts which had to be made. The only alteration to the saddle itself was reaming the fork ends to $\frac{5}{16}$in. at the top of the springs where they were attached to the old underframe, to allow them to rock on the new extension pieces, $\frac{5}{16}$in. in diameter.

In fitting the front clip on to the frame tube, care should be taken to drill the hole A so that the tubular distance piece bears hard on the top of the frame tube—in fact, I drilled mine about $\frac{1}{32}$in. low, and had to file a half-round groove in the distance piece before I could get the clamping bolt to enter. A $\frac{1}{8}$in. taper pin fitted right through the clip and the frame tube makes assurance doubly sure. —F.B.S.

A USEFUL VALVE GRINDING TIP.

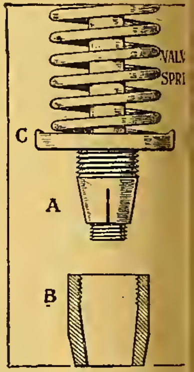
IN cases where a brace and bit cannot be used the rotational movement of the valve may be obtained by rigging up the device shown in the accompanying illustration. It is necessary to equip a screwdriver in the manner shown, that is to say, with a handle at the top end, which will allow the screwdriver-shaft to turn independently of it, and a pulley in the centre fixed solidly to the shaft. Then make a bow by looping round a piece of thick iron wire in the manner shown and loop the string round the pulley. By this means even pressure upon the valve, and an even movement in both directions can be maintained.—*L'Automobile aux Armées.*



A device for obtaining rotational movement when grinding in valves.

VARYING THE TENSION OF A VALVE SPRING.

THE following device shows how t tension of the valve spring can altered and the valve spring tak off without the trouble of holding up t spring while the cotter pin is taken out:



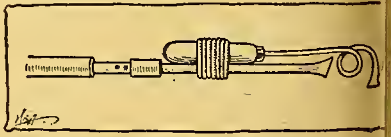
An easy method o varying the tensior of a valve spring.

The end of the valve stem is threaded, and on it is screwed the nut A, the top part of which forms the support for the spring. Below the support C the nut is threaded on the outside for $\frac{1}{4}$in., and the lower part is narrowed towards the end, and has four slits half-way up. The locknut B screws on to A and presses the lower part of A against the valve stem, and so locks it. To remove the spru unscrew the locknut B and then unscr the nut A.

The spring tension may be altered just loosening B, adjusting A the quired amount, and tightening up again.—G. R. More.

A HOME-MADE GAS SOLDERING IRON.

THERE is no more useful tool in t motor house than a gas solderi iron. One of these may be made the following manner: Procure a sm piece of petrol pipe, the end of whi should be flattened out; drill three sm



A home-made gas soldering iron.

holes at the opposite end, which shou be covered by means of a sleeve so to provide a means of adjustment for air; lash a file handle to the copper p by means of wire, and in this han insert a piece of thick copper wi making a spiral just in front of the of the copper tube, aud flattening end. The iron may be used with coal acetylene gas. The flat end of the provised soldering iron must be tinn of course, in the usual manner.—*L'A mobile aux Armées.*

OCCASIONAL COMMENTS

By "Ixion."

The Anti-cycle Carist.

PRESUMABLY we were not meant to take "R.H.B.'s" denunciations of cycle cars too seriously; as humorous exaggerations they were xcellent. Not a word in them would apply to such cycle car as a 1912 Morgan: *a fortiori* they will not pply to a 1920 four-wheeler: and he has only himself blame for investing in one of the less successful pes of machine which at its best was prematurely arketed. He may be interested to know that one of ur leading designers is seriously considering the pro- uction of a 20 h.p. four-wheeler, with its engine ounted on ash bearers, *à la* aeroplane, cable and obbin steering, and with a belt drive! The crying eed of this type of cycle car is a little attention from ukka engineers: in the past it was far too much of a ack street file-and-hammer job.

The Yankee Lilliput Car.

I WISH one of our readers in U.S.A. would send us some accurate description of the curious little cycle cars which American enthusiasts appear to building at home by ones or twos. They are minia- re duplicates, externally, of famous racing cars, d usually consist of the power plant of a big V twin cycle, mounted in a home-made chassis. In other ords, they are the private owner's conception of hat a Carden monocar tried to be as a manufacturing oposition. They rather appeal to me for winter ding. They have most of the merits of motor cycles, d none of their bad weather shortcomings. On the her hand, their cost is probably ridiculous, and will event their ever figuring as a production job. When get a little leisure and a few odd bits of tubing, I ink I must try my hand at one.

Stunt Two-strokes.

WE all know that from time to time a stunt two-stroke appeared in the flying mile type of competition, and put up a marvellous show. ome of us were puzzled at the failure of these henomenal engines to make a commercial *début*. he explanation of the mystery is very simple. They verheated so shamelessly that they could only be riven in penny numbers, and could not even travel a distant hill-climb by road. During the war, some their defects have been eliminated, and rather stounding discoveries have been made. For example, certain aero engine designer was persuaded to put is special knowledge at the disposal of one of the vo-stroke firms. He planned a special engine, which as a duplicate of their standard in every respect xcept that it possessed cooling factors designed on a asis of knowledge, in lieu of the rank guesswork hich formerly governed that special aspect of motor ycle production. The resulting engine, though of uite small capacity, will average 30 m.p.h. indefinitely with a sidecar attached, and evinces no tendency to overheat. I do not say that the other common failings of two-strokes have yet been eliminated. This engine does not two-stroke down to slower speeds than its predecessors, nor can it be used with any old sparking plug, nor does it register 100 m.p.g. But its performances prove that things are moving in the two-stroke world.

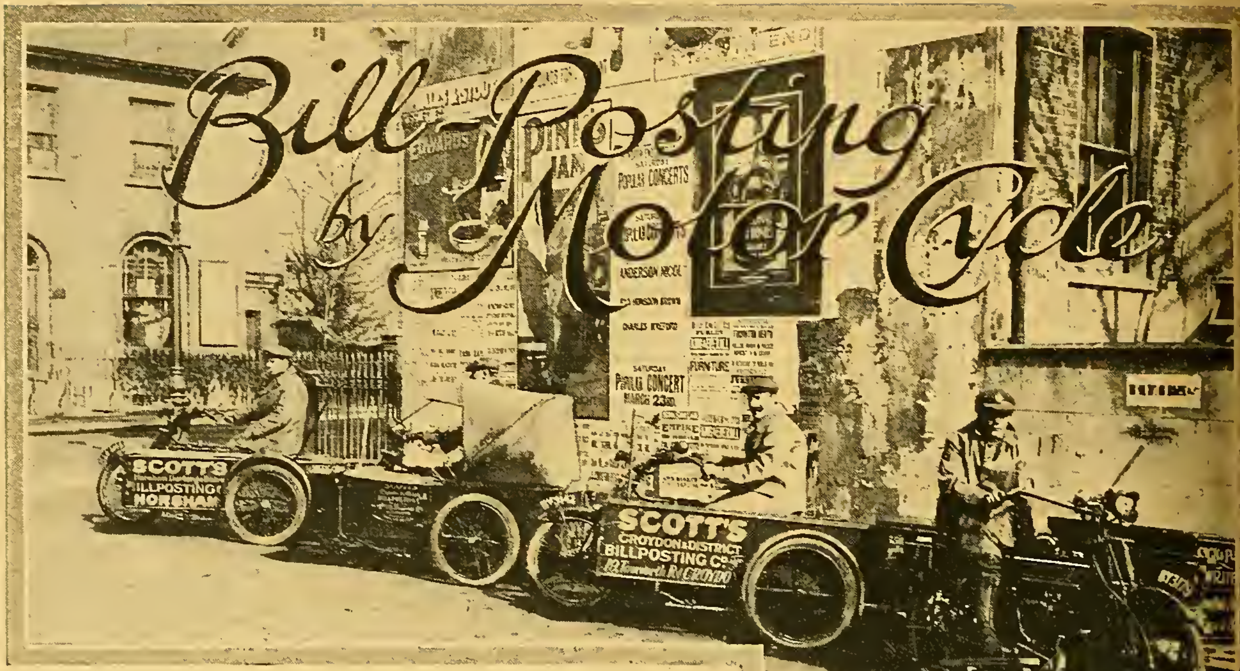
The Future of Two-strokes.

THE experiment detailed in my last paragraph has a peculiar interest to my mind. Technically, two-strokes are stagnant. Their manufacture almost entirely ceased four years ago, as they were not sufficiently developed to be useful for war purposes: and we might suppose peace would find them very much as they were in 1914. A single experiment has banished one of their main bogeys, and the transformation is due to deductions from research in a totally different sphere. I dare not say what the compression ratio of the engine under question is, because nobody would believe me. Anyhow, this solitary engine has helped one firm to see its way to make big air-cooled two-strokes which will be roadworthy. In addition to the increased power and perfect cooling, they have got rid of oil-cooling and can use a thick electrode sparking plug without sooting it every few miles, that, too, without getting four-stroking at low speeds due to over-lubrication. Give them twelve months of free experimental work in peace and they will evolve something interesting.

Comparing Consumption.

I WAS careful to state that comparisons between motor cycle and aircraft engines in respect of fuel and oil economy could only be approximate, and that I had no wish to press the estimated figures which I gave. Nevertheless, I have several remarks to make in answer to Mr. Brooker and others. The first is that it is perfectly fair to compare engines on the basis of the work which they ordinarily perform. So the consumptions of a motor cycle should be reckoned on, say, a trip from London to Brighton at an average speed of 20 m.p.h. and of an aero engine at its normal r.p.m. In the second place, if the mileage per gallon of light cars and motor cycles is mere guesswork, we can none the less absolve the aero engine from the charge of extravagance, because modern aero engines approach within about 10% of the maximum thermal efficiency now obtainable; nobody can assert that road engines come nearer that ideal. In the third place, something is to be learnt from the fact that precise fuel and oil statistics are valued in the aircraft industry by maker, buyer, and user alike: whereas no valid statistics have ever existed in the motor cycle or motor car trade. The sooner motor cycles and cars are manufactured and sold under stringent consumption standards, the better for us all.

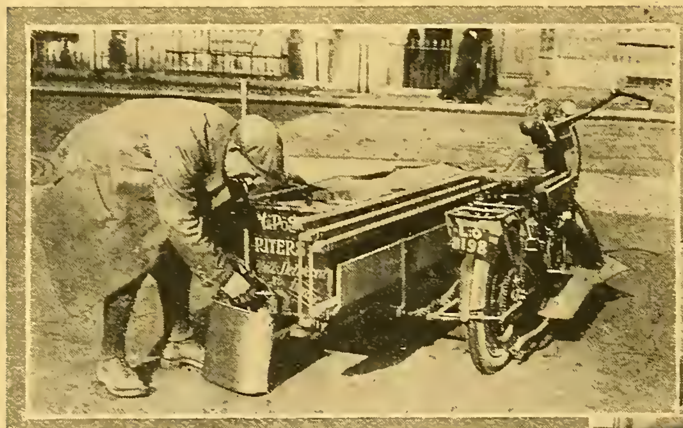
Bill-Posting by Motor Cycle



The four Enfield sidecars which have been of much value in the work of bill-posting in the outlying London districts.

Effecting Economy by Replacing Horses and Vans.

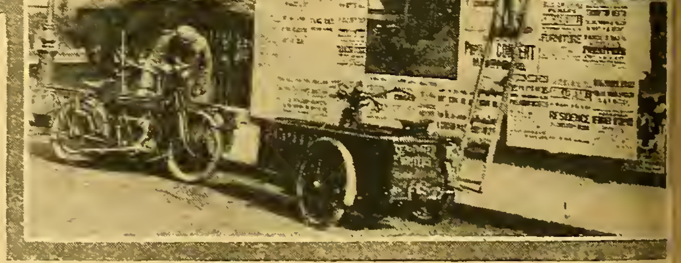
HOW the motor cycle may be made successful in business is clearly demonstrated by the following account of the work of a London bill-poster, Mr. A. Scott, who at the outset of war lost most of his men. Before hostilities began he employed eleven men, three horses and carts, and three handbarrows. He then started to use Enfield motor bicycles and sidecars, and can now carry out the same quantity of work with four men, each mounted on a sidecar combination.



The bill-poster's outfit, showing the paste tank at the rear, and the neat manner in which the ladder is stowed away

The first machine, which was purchased in 1914, covered 16,000 miles the first year it was in use, and one of these motor cycling bill-posters travels 125 miles a day, covering a distri extending from Streatham to Billingshurst, includi Epsom, Ewell, Leatherhead, Dorking, and all tow and villages in the neighbourhood. The man occupied in posting bills for auctioneers' announc ments, cattle sales, and undertaking all Governme posting in that locality. The special sidec bodies have been designed by Mr. W. J. Fla manager to Mr. A. Scott, advertising contract 19, Tamworth Road, Croydon.

The motor cycle and sidecar chassis are standard Enfield manufacture, but the body c sists of a hard wood frame with Venesta pane strengthened by angle irons round the top a down each side, painted with four coats of pa



l-posting by Motor Cycle.—

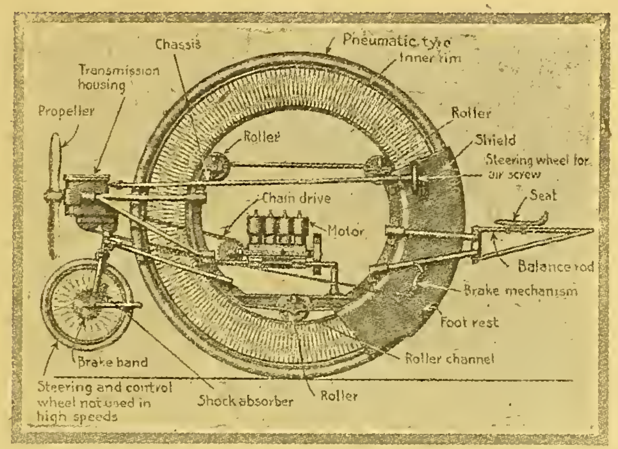
any desired colour, varnished, and lettered. The ar of the body is supplied with a galvanised iron k and a tap for the paste, while there is ample om for cans, brushes, and bill-posters' accessories. e centre portion is covered with a movable water- oof hood to keep the bills dry. The three-slide lder, which extends to 18ft., is carried in a special partition built out to accommodate itself to the shape of the ladder.

The amount of work done by these sidecar combinations gives a clear idea of how much labour and expense are saved by this method of transport. Mr. Scott assures us that even when the war is over he will never go back to horse transport, so satisfied is he with his new steeds.

THE MOTOR UNICYCLE.

Two Brain Waves from America—a 10ft. diameter Unicycle and a Gyroscopic Single-wheeler.

N the mechanical world, America is regarded as the home of freak ideas, gineering (?) nightmares d absurdities, but very ten the germ of a great ea is found in the speci- ation of the most fan- stic invention. For this ason America should be oud that it has men with eas, whatever their value, cause there is more merit originality than in pying..



A curiosity in American motor design. If a unicycle could be driven with a smaller resistance and at greater speed than a bicycle, if it could be built more economically or compactly or could be operated more safely or enjoyably, and if small air-screws could be made to apply an effective thrust against the atmosphere, the combination might lead to desirable results. But in each of these things it is inferior, and their combination multiplies the degree of inferiority to the motor bicycle.

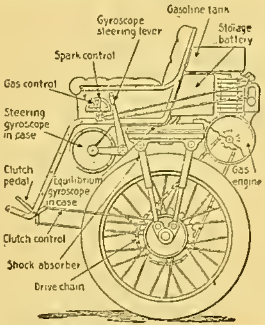
We illustrate on this ge two ideas emanating om America which aim the same end, *i.e.*, the oduction of a single-wheel otor cycle. As to whether ere would be any advant- e in a single-wheel motor cle it is difficult to say: any case, neither of the nventions" shown here pears to possess ad- ntages that would justify its production. Both, wever, are interesting, one because it illustrates how far some inventors will go in straining after originality, and the other because it embodies gyroscopes for balancing and steering.

A single wheel motor cycle, having gyroscopes mounted in vacuum cases to steady it. The bizarre idea is essentially American.

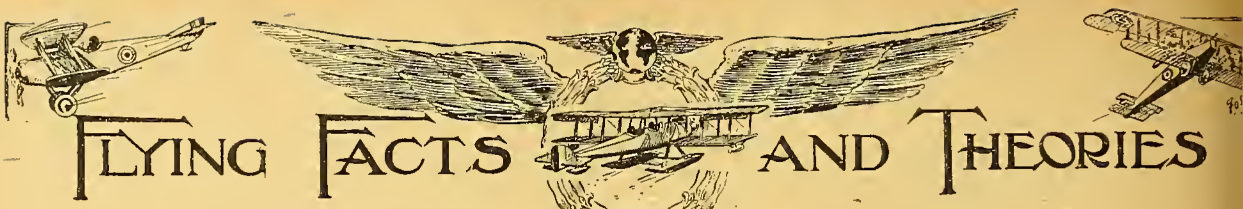
The first illustration depicts what can be described only as a mechanical monstrosity, and, at the best, the drawing was probably intended by its inventor to be nothing more than diagrammatic. It will be noticed that, judging from the relative positions of the sliding seat and the foot-rests, the wheel would be nine to ten feet in diameter, while, although the four-cylinder engine is presumably of the water-cooled type, no provision is made for the cooling of the water. What happens while the driver is climbing into his seat can be better imagined than described, but it is more difficult to imagine how such a contraption would be replaced in a vertical position after having fallen over upon its driver.

The other "invention" is a little more sensible. An electrically - driven gyroscope is intended to maintain the machine in an upright position, while a second gyroscope is installed on two bell crank levers to operate the steering. One would imagine that, if such a machine were got under way, it would be very unpleasant for the rider should the electrical connections short circuit or the accumulator run down while travelling at a high speed. Similarly unpleasant would be the tendency for the whole contrivance to revolve around the wheel spindle when increased power was needed to climb a hill, for then it would become a struggle between the power of the engine and that of the gyroscope. For this reason probably only a single gear is recommended in conjunction with a "gas engine," the bore of which, if the illustration is intended to be taken seriously, would be about 50 mm.

Referring to this design our American contemporary *Popular Science Monthly* says: "Imagine the sensation of racing down the road on a one-wheel vehicle! All the world is ahead, only the one wheel is beneath, and a man is free to career and career as much as he likes—or more! No wonder inventors experiment." But there's a wealth of meaning in that "—or more!"



Details of the gyroscopic single wheel motor cycle.



FLYING FACTS AND THEORIES

THE SPINNING NOSE DIVE.

By W. G. ASTON, A.M.I.A.E.

THE spinning nose dive is an aerial evolution which has in the past earned a particularly unpleasant reputation, although, thanks to intrepid experimenters and to modern methods of flying tuition, it has, of late, lost most of its fearsomeness, and is now freely indulged in by pilots of all degrees of skill. Like all other manœuvres, it is perfectly safe if carried out at such an altitude that recovery into straight flying is capable of being performed, but in the earlier days of aeroplanes reasonable altitudes were so rarely reached and the conditions of the spinning nose dive so little understood that it but rarely occurred without being followed by disaster, so that in very few cases could the experimenter give any information upon it to other pilots. Apart from that, it was then quite accidentally provoked instead of being carried out, as it now is, generally on purpose.

Do the Controls Change Places?

It is sometimes said that when an aeroplane rolls over through 90°, so that its wings, instead of being horizontal, are now vertical, the controls change places —that is to say, the elevator becomes the rudder and the rudder becomes the elevator. This is a loose sort of expression, but its meaning is clear enough. Strictly speaking, it is untrue, because the elevator is, in all circumstances, employed to rotate the machine about its transverse axis; similarly, the rudder always rotates the machine about its vertical axis, and it makes really no difference whether these axes adopt new positions or not. On the other hand, the idea of the elevator is inextricably associated with turning the machine in a vertical plane perpendicular to the earth, and the rudder with turning it in a plane parallel to the earth, and in this sense the expression is defensible. Suppose, for instance, that the machine is rolled over as shown in fig. 1, then to lift or depress the nose of the machine relative to the earth it will be necessary to use the rudder as an elevator. Similarly, if it is desired to turn the machine in a horizontal plane, this evolution will be performed by means of the elevator and not by the rudder. In the meantime, each canted organ takes effect about the same axis as formerly, only with the machine rolled over its vertical axis has become horizontal relative to the ground for the time being.

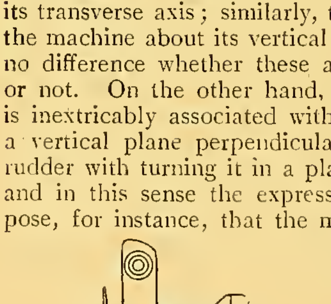


Fig 1.

How Knowledge was Acquired.

It is this fact, or rather because this fact was nc fully realised, that led to so many spinning nose dive ending in serious "crashery." The machine adop an attitude that the pilot is instinctively inclined t think can be corrected with the rudder, whereas it really the elevator which ought to be worked. Or historic spinning dive was performed by the late L Parke, R.N., at the Military Trials. He found him self hurtling towards the ground and spinning roun in a very narro radius, and he trie without effect to brin the machine straig by means of the win warping and th rudder. These ha no effect at al Within a few feet apparently certa death, and, of cours dealing with circu stances with whi he was totally u familiar, and for which he was equally unp pared, he resolved to try the elevator, although, he afterwards told me, he was quite certain it cou do no good. It immediately brought him out of t spin just in time to prevent a catastrophe, and at stroke the foundations of knowledge were laid as as the spinning nose dive was concerned.

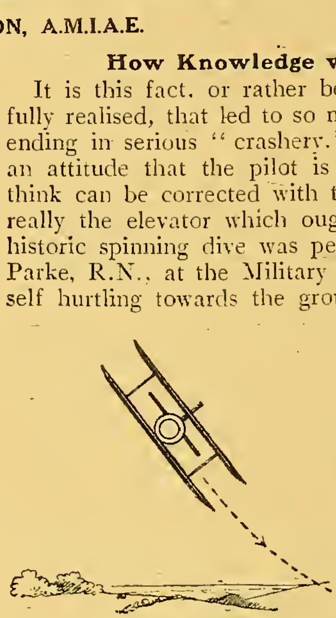


Fig. 2.

The Cause of Spinning.

Consider an aeroplane in the attitude shown in f 2. It is supposed to be flying towards the read If it be allowed to stall in this position it will tend correct itself by two actions; first by side-slippi towards its left to get on to an even keel, and secon by diving towards the reader, so as to acquire fly speed. A stable machine if left to itself will perform this recovery of its own accord.

If, however, the pilot pulls the stick towards him, and so sets the elevators at a negative angle, whilst the machine is in the position shown in fig. 3, he will partly tend to bring the nose of the machine up and partly make it turn to his left. This will entirely

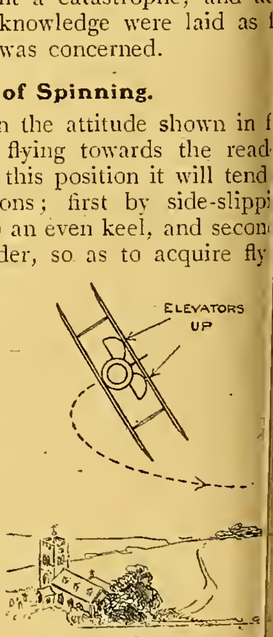


Fig. 3.

ing Facts and Theories.—

feat the natural recovering action of the aeroplane, d in most cases in these circumstances it will imme-ately spin. Since the machine will have now rolled er at such an angle that the elevator and rudder ve almost entirely interchanged their functions, the dder will make very little difference indeed. If eft" rudder is applied it will simply make the chine tip its nose down and dive quicker; if put to the right it will increase the diameter of the in, but will not bring the machine out, since its action this direction will be overwhelmed by the elevator. Also since the angle of incidence of the main planes ll be now very big indeed, something like 60°, the erons will have no appreciable effect at all in aightening the machine up.

How to Straighten Out.

Recovery can only be made by pushing the stick rward. Once the elevators are set at a positive neutral) angle, the tendency for the machine to ep turning in a horizontal plane is removed, and, if ble, it can be then left to recover itself, or simul-neously with pushing the stick forward the right dder can be applied and the aeroplane quickly ought on to an even keel. Once it is allowed to me out of the spin the ailerons can be brought into tion for straightening up purposes.

Some machines are difficult to get into a spin, and ers easy. In general, however, the royal road to nning is either to bank the machine well over and dder outwards instead of inwards, or to stall the chine when partially banked by pulling the stick vards one.

The impression in a spinning nose dive is that the tre of the spin is somewhere not far from the axis the machine, but in most cases this virtual centre well outside the inner wing tip, though on some chines it can be brought within the span. The fact that incidentally the earth seems suddenly to have gone completely mad is not calculated to assist a pilot thinking clearly when spinning for the first time.

The Use of the Spinning Nose Dive.

Fig. 4 shows the evolutions diagrammatically. The dotted lines indicate the path which the machine would normally take if allowed to side-slip and finally dive straight forward. In the course of this side-slip the fin, of course, will tend to straighten the machine up and cause it to meet the relative wind head on. The negatively-inclined elevators, however, act as rudders and force the aeroplane to take the path indicated by the unbroken line. Whilst spinning, the controls can all be in a central position (except the stick, which will be pulled back, though not over to either side), and the bubble instrument may also give a neutral reading.

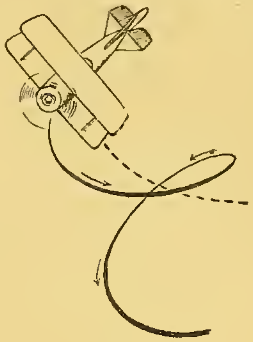
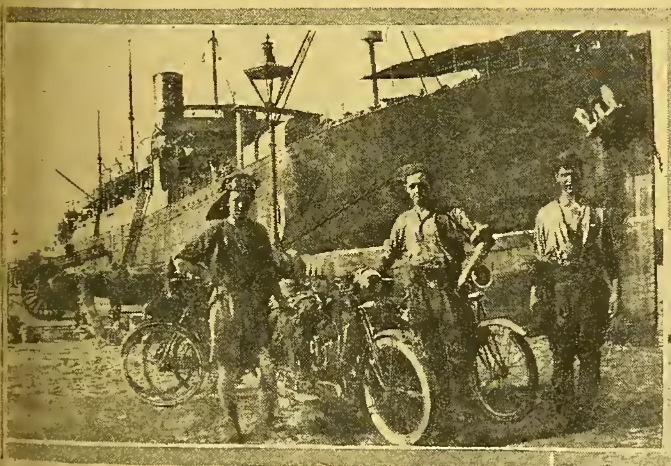


Fig. 4.

A Vertical Descent.

The machine will be heavily stressed, and the pilot will feel that he is being forced down on to his seat by a tremendous pressure, sometimes to such an extent that he will be unable to lift his foot from the rudder bar. Altitude will be lost at a deceptively rapid rate, and it is this fact that makes the spinning nose dive a very valuable evolution, since by its means a pilot can descend from any height to a landing ground practically vertically beneath him, and at a rate of descent which he could not equal by any other means.

SCENES IN THE NEAR EAST.



(Top) Despatch riders on the quay at Alexandria.

(Bottom) On the bank of the Suez Canal. In the district in which the photograph was taken there are good stretches of roadway, and it is an agreeable change for the despatch rider to be able to let out his machine for a good spin on top gear after the perpetual second gear work in the soft sand of the desert.

Cpl. Webb, who sends us the photographs, speaks well of the way the gears of the Triumph and Douglas motor cycles have stood to the hard work entailed in despatch work in Egypt and Mesopotamia.

The Munition Worker and his Petrol.

Impressions at a Meeting of the National Motor Cyclists' Fuel Union.

IT was with a perfectly open mind that we attended a recent meeting in Coventry of the National Motor Cyclists' Fuel Union, and, we confess, we felt a stranger in a strange land, for it was not a meeting of motor cyclists such as we have been accustomed to attend.

Where were the care free boys of all ages, who risked their necks for a medal in times of peace? we asked ourselves, as, glancing around the large and crowded room, we realised that this was no protest against conditions of sporting competition framed by men wiser than themselves. It was a protest against conditions imposed upon them, and all motor cyclists, by those in whose hands lies the safety of the nation.

In place of the genial faces of the sporting motor cyclist we saw grim men—young men mostly, some very young indeed—with toil printed deeply upon their features: the workers instead of the players, and the motor cycle assumed an importance beyond that of the mere pleasure machine. These men knew the motor cycle as a utilitarian machine. It was their bridge between home and work. That bridge had been taken from them, and the *détour* necessary on that account was sometimes long, sometimes inconvenient, and always unpleasant. They considered they were entitled to an allowance of petrol to permit them to travel to their work, to go home occasionally, and, we were sorry to hear, for recreative purposes.

Petrol for Recreation.

Those workers who ask for petrol for recreative purposes certainly consider they are entitled to use their machines for the sake of their health on account of the nature of their work and its value to the country, but we think the same justification, if such exists, may apply equally to many others who are not connected directly with the production of armaments. The question at the moment is whether the benefits derived are as nationally important as the amount of fuel so consumed.

As we have pointed out in previous issues, if every motor cyclist in the country were allotted two gallons per month, the annual consumption would require but one-eighth of a cargo of a tanker.

But why has the Government appointed a Petrol Economy Officer, whose duty it is to prevent waste not only among the civilian users of fuel, but also in the Services? Why should another officer be sent to France, into the very war zone, to carry out the same work, and how can the saving of a few gallons here and there affect the general situation when such huge quantities are involved.

There must be a reason, a necessity, for the Government's action; and this reason may be found allied to the food and shipping shortage.

Because the Forces consume millions of gallons of fuel is no reason why civilians should use even a few hundred gallons unnecessarily, because *the carriage of one gallon of fuel involves shipping space which could be used for material to make five 2 lb. loaves of bread.*

The question for the members of the N.M.C.F.U. to decide is whether they are fully justified in using cargo space for 20 lb. of bread per month. We think that no man who asks for petrol for recreative purposes can satisfy his conscience on this point.

Renewed Permits to be for Nine Months.

Mr. A. W. Torkington, of the A.C.U., and chairman of the Fuel Union, made several interesting observations at the Coventry meeting.

He reported "very satisfactory" progress. Every genuine case from the provinces put forward by the Union had been granted petrol supplies. In London the Union had not been so successful, owing to the number of other means of transport available.

Mr. Torkington said it was the object of the Union to obtain two gallons per month for every member of the Union who resided two miles and more from his work, and, provided their cases were genuine and deserving, he had no doubt that permits would be granted to all eventually.

Personally, we think no case is "genuine" where a man lives only two miles from his work. One is constrained to ask whether the majority of workers lived any nearer to their work before the possession of a motor cycle was within their means. Our impression from the debate which followed the addresses was that these men resented their masters and managers using cars while they were compelled to trundle a pedal cycle. Many cases were mentioned—almost spitefully, one is bound to say—and Mr. Shrapnell-Smith, the Petrol Economy Officer, who addressed the meeting, ask the members to let him have particula of specific cases, when he would invest gate them. Yet these men were aski to be allowed to do the same thing, a they gave one the impression that, whi they considered they were entitled to u petrol to get to their work, those mo fortunate than themselves should not ha the privilege.

Mr. Shrapnell-Smith, in reply to question from a member, said it w impossible to apply rationing to t Services. It struck us as ludicrous th these motor cyclists who asked for pet for recreative purposes and to get their work, when it had been prov that they could do without it if it w really necessary, should suggest rati ing the petrol to those who are keepi from them the horrors of warfare.

Inconsistencies.

Surely by such inconsistencies, it impossible for the Union to retain long the sympathies of the Ministry Munitions, the Petrol Controller, the Home Office which it has at present time.

Another point which appeared to us tending in the same direction was remark made by Mr. Torkington to effect that efforts were being made interest the various branches of A.S.E.

Mr. Torkington appealed for a stro membership. At present there w 3,000 members; but, he said, he war to be able to speak for 10,000 memb when it would be easier to get concess *to enable munition workers to use t machines for the benefit of their healt*

Since the objects of the Union supposed to be national and patriotic is trite to say that the more mem the Union obtains the less patriotic becomes.

Mr. Torkington advised the mee that between three and four thous munition workers had been gra licences within the past two or t weeks, from which one may gather munition workers *are* being given ferential treatment, and that if members of this community are to ob full supplies, then the Restriction O No. 2 becomes not a means to econo fuel, but merely a redistribution sch under which an almost new "crop" motor cyclists benefits at the expens motor cyclists generally.

RECRUITING WORK BY AN AMERICAN MOTOR CYCLE FIRM.

THE Harley Davidson Motor Co. are making a great effort to secure proficient motor cycles for military duty, and have sent out the following letter to hundreds of motor cyclists in U.S.A., in an endeavour to attract men for the army.

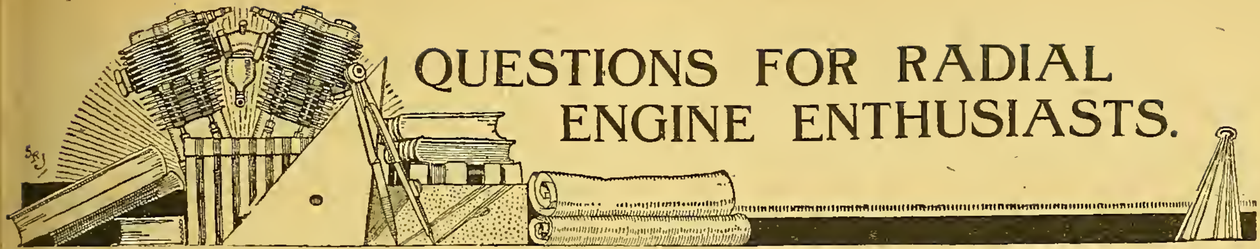
"The motor cycle is playing an increasing part in the present world-war; the Government is recognising the need of men with specialised training for motor cycle duties, and is giving motor cycle mechanics preference.

"The first unit of the mechanical repair shop for Overseas service, which includes a motor cycle unit, is being formed in Washington. Capable men are and will be needed as motor cycle mechanics and in training schools. Several Harley-Davidson dealers and dealers' mechanics are already in the motor cycle service.

"This service offers an excellent opportunity for men with mechanical ability, and we advise all motor cycle mechanics who are subject to the draft or willing to enlist, or are alread service, to file applications with us.

"Harley-Davidson readers and chanics already in military service sh file applications, regardless of the that they are in the service.

"If you are personally subject to draft and wish to file your applic with us, we shall, on request, ho until such time as you may specify is apparent that all who are subje the draft will be called for service tually."



QUESTIONS FOR RADIAL ENGINE ENTHUSIASTS.

Will the Radial Engine ever become Popular on Motor Cycles?

BY AN AMATEUR DESIGNER.

I BELIEVE there are some people who have the idea that the only writers entitled to contribute to technical journals are those who happen to be acknowledged experts in their particular subject. For instance, according to this theory, no one should be allowed to write about engine design except notabilities of the type of Mr. Coatalen, Mr. Scott, or Mr. Bradshaw. Now this is a totally wrong notion, for at least two reasons. In the first place, gentlemen who are as talented as those I have named have something better to do than merely to write articles about designing; they can spend their time much more profitably in actually designing engines. Besides, one of the chief functions of *The Motor Cycle* is to enlighten its readers on all matters that fall within its compass, and unless its patrons were allowed from time to time to betray their need for enlightenment, as I am now about to do, it would be difficult to determine which form of technical knowledge was most in request. Anyone who is expecting one of those "authoritative" or "informative" articles, therefore, need read no further; my object is not to impart information, but to solicit it.

What I wish to elicit are some sound reasons for the hopes that are held out as to the possibility of adapting radial engines to motor cycles. As far as one can judge, the reasoning hitherto followed is that since radial engines for aeroplanes have certain advantages over other types of motor, they will be even more conspicuously successful for motor cycles. Hence all that need be done is to enshroud the proposal in a sort of rosy glow of optimism, to reiterate in buoyant tones, "Radial engines are *bound* to come"—and to leave it at that. Personally, I do not find much ground for confidence here; I should like to know a little more clearly just what kind of a thing the motor cycle radial engine is going to be, if, and when, we get it. By the use of a little mathematics one can attempt a rough forecast of the characteristics of such an engine; and then it rests with its upholders to point out how practical considerations are likely to affect the theoretical conclusions that I shall reach.

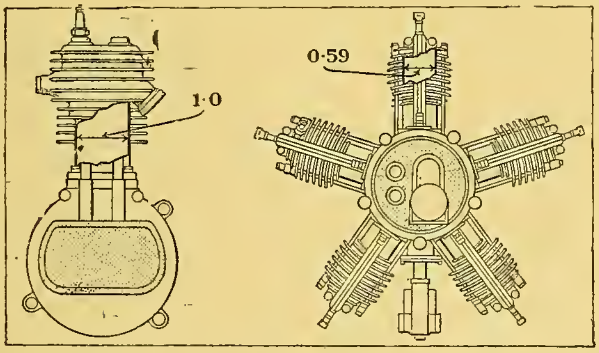


Diagram showing comparative size of single-cylinder vertical engine and five-cylinder radial engine of equal total cylinder capacity.

Pros and Cons.

By way of giving the radial a good start we will deal first with

(*a*) COOLING.—For purposes of comparison, a single-cylinder engine and a five-cylinder radial of the same total capacity will be considered throughout. Then the corresponding cylinder dimensions will be in the ratio $1 : \frac{1}{\sqrt[3]{5}}$, or $1 : 0.59$, as shown to scale in the sketch. Now the cooling area is obviously proportional to the *square* of the linear dimensions. Therefore, if the cooling area of the single-cylinder be represented by 1, that of the five small cylinders will be $5 \times (0.59)^2 = 1.71$. It follows that the radial will unquestionably be the cooler running engine of the two.

(*b*) WEIGHT.—If the cylinders, pistons, valves, etc., of the radial were exact reproductions on a smaller scale of those of the big single-cylinder—that is, if all the dimensions were merely reduced in the ratio 1 : 0.59—then the five small sets of parts would weigh in the aggregate just the same as the one large set of parts. But this exact proportion between corresponding dimensions cannot be maintained in practice. For example, the cooling fins on the single-cylinder are already cast as thin as they can be, and so it would not be possible to make them any thinner on the radial cylinders. Again, the metal in the pistons of the small cylinders could not be reduced materially in thickness below that of the large piston. Certainly the five sparking plugs of the radial engine would be very much heavier than the single plug required by the opposing design. There can be little doubt, then, but that the total weight of the specified components of the radial will be greater, and not less, than the corresponding figure for the single-cylinder engine. When we come to the crank case the position is obviously reversed, as a glance at the sketch will show; and if the reduced weight of flywheel called for by the radial be taken into account, it cannot be denied that on overall weight the radial may possibly have the advantage. I think it ought to be pointed out, however, that conclusions drawn from aeroplane practice in this respect are apt

Questions for Radial Engine Enthusiasts.—

to be misleading. A radial aeroplane engine sometimes makes such a good showing on a weight per horse-power basis because it is contrasted with a water-cooled vertical machine, in which the weight of the engine includes also the weight of all the water-cooling gear. In the present comparison the vertical engine suffers from no such unfair handicap.

Cost, Economy, and Balance.

(*c*) COST.—As far as an amateur can judge, the single-cylinder engine has it all its own way as far as production costs are concerned. Considering first the cylinders and similar parts, the ratio of the total areas to be machined in the two engines will be roughly the same as the ratio of the cooling areas, *i.e.*, 1.: 1.71. Since the machining allowances cannot be reduced in the radial engine components, we see that their machining involves the removal of nearly double the metal that need be tooled in the single engine. Although the radial crank case is smaller, it looks to me a more costly job to machine than the corresponding component in the "single." The increased expense necessitated in viewing, assembling, etc., five parts instead of one requires no demonstration.

(*d*) ECONOMY.—The radial will be more expensive to run, as well as more expensive to buy, for I do not see how its overall efficiency can possibly equal that of the single. Assuming the work wasted in friction between the piston and cylinder walls to be proportional to stroke × circumference of piston, that is, to the square of the linear dimensions, we see that the loss in the five radial cylinders will be 1.71 times the waste in the one big cylinder. It is a little difficult to see how the figures for the rotating parts will work out, but I have little fear of anyone being able to prove that the radial has advantages that will counterbalance its shortcomings in respect of piston friction.

In theory, at any rate, compression will be more reluctant to live contentedly in a radial engine than in a single. Taking piston leakage alone, the chances of the gases escaping may be taken as proportional to the total piston circumferences, that is, as $5 \times \pi \times 0.59$ for the radial to $\pi \times 1$ for the single, or as 2.9 to 1. Poor compression means high petrol consumption.

(*e*) BALANCE, ACCESSIBILITY, SIMPLICITY, TORQUE.—No contest is necessary here. as there is no comparison between the two types of engine in these respects. Either one or the other is hopelessly outclassed, according to the particular quality that is selected; we will therefore call honours even.

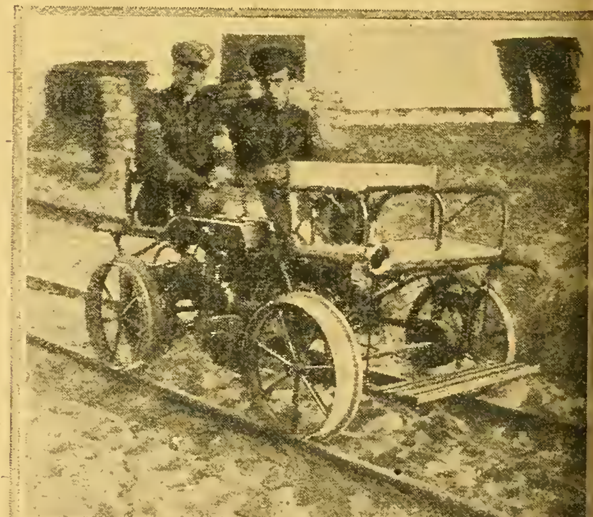
Inductive Reasoning.

Just as this problem lends itself well to mathematical methods, it seems to me to be peculiarly susceptible to the inductive method of reasoning; that is, by arguing from the known characteristics of one and two-cylinder motor cycle engines to the, at present, unknown properties of five and seven-cylinder power units. For instance, if an actual twin engine is found to be lighter than a single of the same capacity, then we can reasonably hope that the projected five-cylinder radial will be lighter than the twin. Or if experience shows that a single is cheaper to build and to run than a twin, then it is hardly likely that a radial will be anything but dearer. This method, therefore, is simply a matter of collecting and comparing facts. Information would be particularly valuable that related to engines produced by the same firm. Frequently a single and a twin of identical capacity are built in the same factory; could not comparative figures for such engines be published.

Facts Wanted, not Opinions.

The next move lies with the radial engine devotees themselves. If they do not make good their case now it will not be for lack of opportunity. Those who revel in elliptic integrals and differential equations of the third degree can assail my mathematics; while those of the hardened rider variety can relate their experiences with various classes of engines. But be it noted that it is facts, and not opinions, that are wanted. Petrol consumptions should be stated in terms of pints per hour (to three places of decimals) and not in terms of tankfuls and bulbfuls. Horse powers, too, should be the results of brake tests, and not of ascents of hills at estimated speeds, the gradien being assumed and the following wind ignored.

One other thing I should like to be satisfied about i the use to which the motor cycle radial engine is to b put. If it is merely to be embodied in 12 h.p. machine with the object of sweeping the board at race meetings, my interest in the proposal is at an end. M view is that if 2¾ h.p. motor cycles are found t meet the needs of D.R.'s, they should suffice fo carrying civilians to the seaside on a Saturday afternoon; while 5 h.p. sidecar outfits that are good enough for transporting machine guns should satisfy even th Best Girl in the World. Possibly, however, the ide is to take advantage of the lightness, even torque and excellent balance of the radial engine to produc diminutive units that will perform the same service a our present mounts at far less cost. I will enrol myself as a radial engine enthusiast if it will assist in th evolution of a motor cycle scaling 70 lb. all on, havin a single-geared engine of 1½ h.p., and a half-gallo tank good for a hundred miles run at one filling.



ON A METRE-GAUGE RAILWAY IN EGYPT.

A Triumph motor cycle built as an integral part of the chassis by the Egyptian State Railway workshops.

Steering and Stability of Single-track Vehicles.

INTERESTING CONCLUSIONS REACHED BY MATHEMATICAL PROOF.

The following notes on the stability of motor cycles are taken (as promised in our issue for Feb. 14th) from an article written by Mr. Geo. S. Bower, which appeared in "The Automobile Engineer" for October, 1915. It should be noted that all the statements and conclusions are proved mathematically in the article from which they are taken, and our scientific readers are advised to refer to this article if they wish to pursue the matter further, when they may rest assured of finding much to interest them. We regret that space does not permit of our printing the whole argument.

T is proposed to consider certain of the dynamical principles involved in the steering of two-wheeled vehicles, more particularly bicycles and otor cycles, and to show the effects of various factors the roadworthiness and security of the machines. ecial attention will be directed to the gyroscopic uples acting on a bicycle, and it will be shown how ne of these may be utilised to assist in the balancing the machine.

The steering and behaviour of a bicycle are very ich affected by the state of the road surface, ecially as regards its frictional qualities, and, in first place, it will be assumed that sufficient friction sts between the wheel and the road to prevent side-.

Forces and Couples acting on a Bicycle in Motion.

So long as a cycle is moving horizontally in a aight line, with its longitudinal plane vertical, the ly forces acting on it are its own weight vertically wnwards, with the resulting vertical reaction of the ud, the resistance to motion, and the propelling re-ion of the road. All these forces are in equilibrium, d there is no tendency for the bicycle to fall or to viate from its straight path.

Should its centre of mass be displaced by some ans to one side of the vertical plane through the e joining the points of contact of the wheels with road, gravity has now a moment about this line, d the displacement of the centre of mass will rease unless this gravity moment be counteracted.

This is done by turning the front wheel towards side of falling, this action counterbalancing gravity moment in two ways—first, by the fact at the path of the cycle is changed into a curved e having its centre of curvature on the side of lling, the centrifugal force thereby induced forcing centre of mass back to its normal position; ondly, owing to the precessional motion of the front d rear wheels creating a gyroscopic torque, assisting centrifugal force to recover the balance of the chine.

For the same weights and gyroscopic qualities in h case, a high-built cycle will lean over at corners less than a low-built one, but the angle of lean will always be greater than that of a bicycle unsubjected to gyroscopic torques. The Scott motor cycle, which has a very low centre of gravity, has excited much comment during the T.T. races by the sensational manner in which its rider leaned over when cornering. Doubtless the speed at which it took corners was higher than that of many other machines, but not so much higher as one might conclude from the angle of lean.

Before leaving this section of the subject it may be as well to remark that "castoring" the front wheel has no effect on the angle of lean, but only influences the torque exerted by the hands to maintain the cycle in its circular course. The effect, if any, of the wheels being out of track will be to reduce the angle of lean required at a given speed, owing to the cycle tending to fall about an axis not at right angles to the supporting torques, which act in planes at right angles to the wheels.

Skidding or Side-slip.

The above conclusions are based on the assumption that the friction between the wheels and the road is sufficient to prevent the machine from slipping sideways under the action of the centrifugal force when rounding a curve. When this condition is not satisfied, the equilibrium of the bicycle (both theoretically and actually) becomes a very complex matter.

On a wet surface the friction between the wheel and the road no longer obeys the laws of solid friction, but is rather similar to a lubricated bearing, in that the frictional force is *not* directly proportional to the weight causing friction.

Thus the increase in centrifugal force due to increase of mass is greater than the corresponding increase in frictional resistance, so that a heavy machine is more likely to skid than a light one, other things being equal, *i.e.*, assuming the heavy machine is not fitted with such narrow tyres as to bite through the greasy film. Again, the effect of moving the centre of gravity towards the rear, say, is to increase the centrifugal force on the rear end of the machine without a corresponding increase in the frictional resistance of the rear wheel, thus tending to cause skidding of this wheel.

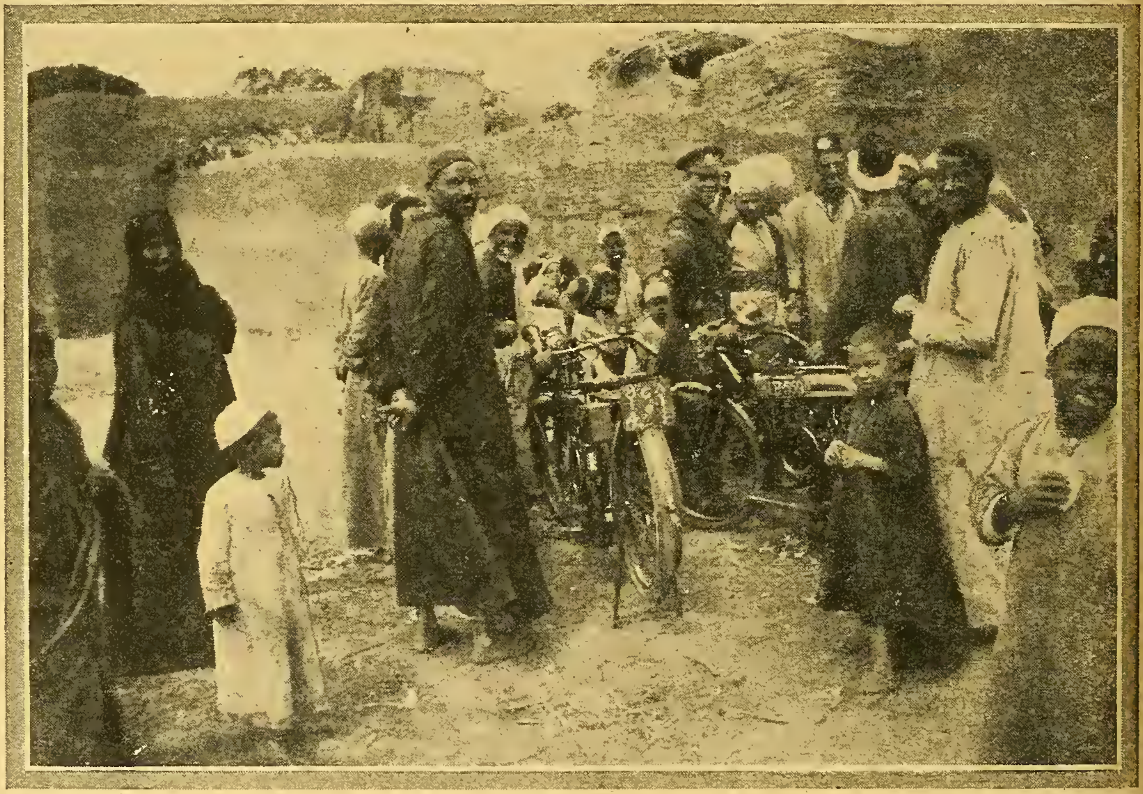
Steering and Stability of Single-track Vehicles.—

From the foregoing remarks, it will be obvious that, for the preventing of skidding, weight is best placed near the middle of the machine, and this points to the desirability of using a countershaft as against a hub gear, and of stowing luggage amidships on the footboards instead of on the carrier.

It is, of course, essential that the centre of mass shall not be so far forward as to cause the front wheel to skid, this being very much more dangerous than the skidding of the rear wheel, whilst sufficient weight must be placed on the rear wheel to prevent its slipping circumferentially. This circumferential slipping greatly facilitates side-slipping, and so is to be minimised by arranging the engine torque to be as even as possible. This again points to the advantages in this respect of belt over chain drive, the peaks of the engine torque curve being absorbed by slip and stretch of the belt instead of by slip of the tyre on the road, as in the case of an ordinary chain drive unprovided with any cushioning device. The two-stroke engine with its even torque, of course, scores heavily in this respect. The effect of sudden application of the rear brake i bringing the machine round is well known. Wha happens is as follows. Suppose the cycle to b travelling in a curved path and the brake to be applie to the rear wheel. The centrifugal force is now abl to move the rear wheel radially, and the angle of lea is made too large. To counteract this the rider steer towards the centre of curvature, thus still further increasing the centrifugal force and the tendency t side-slip. Unless the brake is released, the cycle wil turn round or fall sideways.

Before concluding this section, the author woul like to say that a set of experiments by some independent authority on the frictional resistance to side slip of various types and sizes of non-skid tyre tread on various road surfaces would be of extreme valu and interest. In the absence of experimental evidence the author can only say that he *believes* the total resis ance to side-slip to be the sum of two terms—one function of the weight (as in solid friction) and th other a function of the velocity (as in fluid friction).

(To be concluded.)



Despatch riders in a village in Egypt. The motor cycle is always a centre of interest to the natives, and in this instance the camera also appears to afford some amusement. Note the curious lettering on the number-plate of the Douglas.

* * *

HOME PRODUCED PETROLEUM.

READERS will remember that we have recently dealt with the question now under the consideration of the House of Commons, of boring for petroleum in Great Britain. The matter has been on the *tapis* for some six months, and now, according to rumour, it has once more been brought to the front, and the Parliamentary Secretary to Ministry of Munitions recently stated that negotiat with three different firms were practically comple and it was hoped that some of these firms would s be at work within certain definite areas over wl they would have exclusive rights.

MODERNISING AN OLD MOUNT.

Bringing Up-to-date a Ten-year-old Motor Cycle.

ALTERATIONS and rejuvenations to old-fashioned motor cycles always have an interest to those whose ans do not run to the purchasing of w or expensive second-hand mounts, d this account of the modernising of an d Quadrant may contain information eful to those who possess out-of-date chines. The details of the alteration e as follow :

ting Magneto in place of Accumulator Ignition.

The half-time shaft carrying the com- ed cam for the exhaust and ignition s drilled and tapped, and an extension ed long enough to reach through the ing gear cover, which was bushed to ry it. A sprocket for the chain was ed to the outer end of this extension. platform was made of sheet brass and lted to the engine lug behind the linder to carry the magneto, and a eet iron chain cover made and fitted enclose the driving chain. The gneto is a Simms lightweight model d has given every satisfaction.

Lubrication and Frame Alterations.

The alteration to the tank for the st and Lloyd lubricator was simple, a new hole was cut on top of the k to fit the pump, and the old hole the side of tank sealed up.

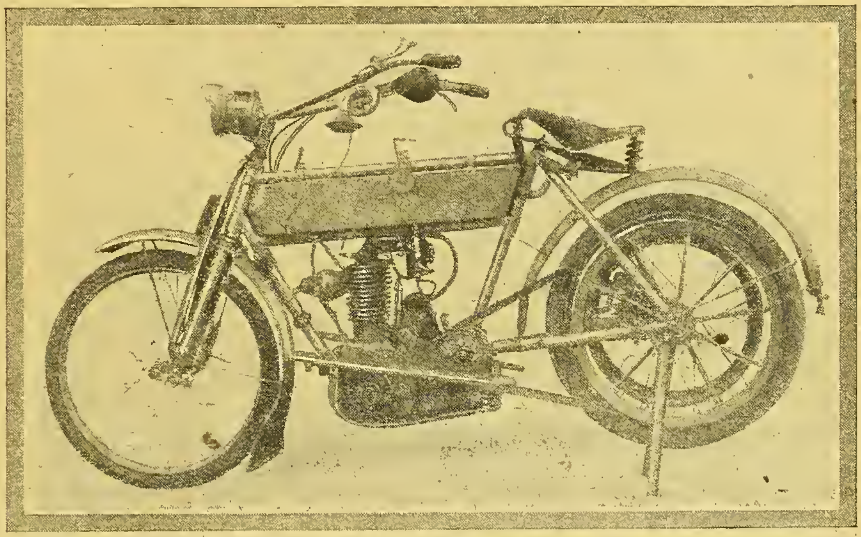
The pedalling gear was removed en- ely, and the bracket shell used to ld the fixed spindle for the counter- aft. The bolt holding the front engine tes to the frame lug was replaced by bolt long enough to form a support both sides for the front end of foot- ards. A strip of steel was bent up form a hanger over the chain stays frame for the rear end of footboards.

The brake pedal on the near side was mounted on a spindle pivoted through the back engine plates and carrying a second lever on the off side. This second lever actuates a double pad compensating brake working on the old belt rim, which was rebuilt into the off side of the new wheel.

Transmission.

The back and chain stays were replaced by stouter gauge tubing, and made wider to take the three-speed hub. The countershaft was made of a back hub shell mounted on the fixed spindle in the bottom bracket. This spindle also carries the clutch pedal on the off side. An adjustable pulley was brazed to this hub shell, and a chain ring bolted to the fixed flange of the pulley. A small chain sprocket was then mounted on the engine-shaft in line with the large chain ring.

The completed machine has been driven two or three thousand miles with sidecar attached, and is a very comfortable and docile mount, although not capable of high speed.



A 1908 3½ h.p. Quadrant, which has been modernised by fitting a three-speed gear, drip feed lubrication, two-step drive, footboards, and several other improvements.

* * *

New Arterial Main Roads for England ?

An American Promise of Perfect Roads for England after the War.

ACCORDING to an American motoring contemporary, there is on foot a scheme for the construction of an tirely new main road system for gland. No one in this country seems know anything about the scheme, but r go-ahead cousins have it as an absolute rtainty that the scheme is in course of eparation for execution after the war, d go so far as to give the full details to how the scheme looks on paper and w it will look in actuality.

Traffic Regulations.

A beginning is to be made with a road m Southampton to London, and from ndon to the North-West (passing rough the Midland manufacturing strict), and so linking up the capital th a vastly improved road communi- tion to the great Southern and Northern rts (Liverpool).

The roads are to be of not less than 150 et in width, and will be divided into ctions, each of which will accommodate affic moving in only one direction, and there are to be no fewer than five sections, presumably there is to be some distinction between the various types of traffic. If this is the case, we beg respectfully to ask our American cousins to have the centre path reserved as a glorious speed-way for motor cyclists. We shall then be able to open our throttles wide at Southampton and never dream of touching them again till we see the dome of St. Paul's, and, having filled up our tanks, we shall then be able to repeat this pleasant performance as far as, say, Coventry, and so on to Lancashire, which looks like getting something in the way of civilised roads before the crack of doom after all. If the new scheme does nothing else but equip with real roads this unfortunate county it should be fully justified.

Tapping Large Towns.

No large towns are to be tapped by the roads directly, but will be reached by branch roads that will tap the new "stunners" only at certain well sign-posted and well guarded points. The roads are to be constructed without regard to existing roads. If the Yank does anything at all, trust him to see that the scale is all right, but when an existing road fits in with the scheme of a new one, then the mighty potentates who have the matter in hand may deign to use the former specimen of the King's highway as a nucleus for the supreme path.

All this being as it is, who will say that the war will have been fought in vain?

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

Apr. 4th	8.5 p.m.
,, 6th	8.8 ,,
,, 8th	8.11 ,,
,, 10th	8.14 ,,

Motoring in France.

The restrictions on private motoring in France are being very much increased. Only a small minority of private citizens are being granted driving licences.

Fuel.

In *The Autocar* of June 5th, 1915, a trial of a new motor spirit known as Natalite was described. This fuel consists of ether and alcohol extracted from waste molasses, and it is of great interest to know that the distillation of this fuel in South Africa has now reached the production stage.

Middlesex Motor Volunteer Corps.

This corps is anxious for motor drivers to assist in the valuable work of transporting troops on leave between the various railway termini in London. Any reader who can possibly volunteer his services is earnestly requested to apply to the Headquarters, 11-12, Silver Street, London, E.C.2.

The Cycle and Motor Trades Benevolent Fund.

At a special general meeting of the committee of the above fund, it was decided that motor hirers should be admitted to the benefits of the fund. To qualify for membership, the hirer must own at least two cars and derive his livelihood entirely from the motor hiring business.

The Formation of a New Centre.

A new branch of the body is shortly to be opened at Newcastle-on-Tyne, and the date for the public meeting will shortly be announced. It is possible that the opening of this branch will be followed by two fresh branches in other northern towns.

The Institution of Automobile Engineers.

The seventh ordinary general meeting of the Institution of Automobile Engineers will be held at the Royal Society of Arts, John Street, Adelphi, W.C., on Wednesday, April 10th, at 7.30 p.m., when Capt. Philpot will read a paper entitled "Some Experiments with Notched Bars." Cards of invitation to the meeting may be obtained on application to the Secretary of the Institution of Automobile Engineers, 28, Victoria Street, S.W.1.

Tyre Prices.

An increase in the price of tyres is probable; consequently, any motor cyclists who are in need of new tyres are advised to obtain them as quickly as possible.

Use of Coal Gas.

In view of several recent prosecutions for the illegal use of coal gas, it may be as well to remind readers that this substitute now comes under exactly the same restrictions as petrol. There is certainly the minor difference that if a permit can be obtained for the use of a motor vehicle the amount of gas that is used is not restricted, but the permit for using the machine is just as necessary if the machine is to be run on coal gas as if it is to be run on petrol.

Short Leave Petrol Licences.

In view of the number of queries we are continually receiving from soldiers and sailors with respect to permits to use their motor cycles or cars when on leave, we repeat that the special motor spirit licences issued to officers and men home on short leave from the Front will be granted only to the registered owners of motor vehicles or to those who have a near relative, such as a father, mother, brother, or sister who is a registered owner. When applying for one of these short leave licences the applicant must state the registration number of the car on which the fuel will be employed.

Special Features.

COMFORT IN SIDECAR
STEERING AND STABILITY
QUESTIONS FOR RADIAL ENGI
ENTHUSIASTS.

"Some" Production.

It is said that the record for one d
production of Ford cars was establis
on November 26th last, when 3,866 c
plete vehicles were turned out. The
posed production for the present yea
900,000 cars.

A French Red Cross School of Motor Mechanics.

There is now at Tavel-sur-Clar
between Vevey and Montreux, a sc
of motor mechanics for interned Fre
prisoners of war. This school is run
very similar lines to those of *The Aut*
Red Cross School of Motor Mechanic
Vevey for interned prisoners of
The latter, as has been mentioned
The Motor Cycle, has been maintai
by voluntary contributions mainly
readers of *The Autocar* and si
journals, who have already subscri
some £800.

The French school is very much
need of a vulcanising apparatus, and
reader who can meet this want wo
find his offer very much apprecia
Communications should be sent thro
l'Office du Travail des Internés, 3,
de Lutèce, Paris.

Taking observations and sending off despatches by motor cycle at Lewis Camp, Washington, where the Intelligence Division of the U.S.A. Signal Corps are in training before leaving for France.

Pe it Renewals.

future petrol permit renewals will be r nine instead of six months—when th are renewed at all.

Mo r Cycles in the British Army.

cording to the report of the War Ca net for 1917, there is an increase fo the year of 91% in the number of mo r cycles in use in the Army.

Th Tanks after the War.

is suggested by an American conte orary that the Tanks will be useful in leaning up the battlefields after the wa The idea is to use them as tractors to raw long toothed harrows to collect th *débris.*

Ar rican Lightweight Record.

ster Manning, on a Cleveland two-st e lightweight, has beaten the twenty-fo hour record; 629½ miles at an average of) m.p.g. are the figures. The rider's we ht was 197 lb.

Be .

e have noticed several motor cycles eq oped with gongs in lieu of horns and K xons. A sweet-toned bell is just as ef tive as a road clearer, and much m e pleasant to the ear.

Co pensation for Damaged Roads.

ompensation for extraordinary damage to ublic roads, caused by timber haulage fo national purposes, is to be dealt with by he Controller of Roads and Bridges, L ds Directorate, War Office, in conju tion with the Road Board.

Is e of Gas Permits.

new gas permits are to be issued ex pt "for public utility services operatin north of the southern boundary of D ham and Westmorland." The exact in rpretation to be put on the words " blic utility services" remains to be se .

Pe ol Restrictions.

eaking at a recent meeting of motor cy ists, Mr. A. W. Torkington, of the A.U., mentioned that Sir Boverton R wood, of the Petrol Executive, had ir rred that after the end of April it w probable that the petrol restrictions w ld be relaxed a little.

M ourne to Sydney Record.

is record has recently been broken b Fred Berry, driving a Harley-Davidson si car outfit (carrying spares and military d patches but apparently no passenger). E time was 22 hours 20 minutes, the p vious record time being 23 hours 40 m utes by a solo machine. The distance is 66 miles.

A Raids and Brilliantly Lighted Cars.

lention was made in these pages of a eport concerning a brilliantly lighted c , often followed by an equally brilli tly lighted motor cycle and sidecar, s n careering through the streets of S en and Richmond during air raids. A the time this paragraph was written w were fairly confident that the vehicles r erred to were on urgent duty, but t s fact has been confirmed by an F.C. officer living in the locality, who a ures us that the two vehicles in q estion are engaged on important work c nnected with raids for which adequate l hts are indispensable.

Motor Cycling in Holland.

The Dutch Army has many motor cycles, including Douglas (English), Excelsior (U.S.A.), Eysink (Dutch), Harley-Davidson (U.S.A.), and Simplex (Dutch).

Fords and Motor Cycles.

The fact that the price of Ford cars has been advanced is hailed with joy by American motor cycle dealers. Tin Lizzie has always been a rival to the single-tracker over there.

Identification Cards.

Munition workers granted petrol permits to allow them to get to their work will be provided with identification cards authorising them to use their petrol between given points.

Lubricating Oils.

Every man in workshop and garage who economises lubricating oils and greases is helping his country. He should, however, take care not to overdo it.

Dual Spark.

A plug which gives two distinct sparks is the latest accessory. Each spark is independent of the other. Useful for back cylinders of oil-cooled twins.

Looping the Loop.

Airmen were not the first to loop the loop. A stage motor cyclist did this stunt twice nightly, years before Pegoud accomplished his startling feat.

What's in a Name?

"Hoyt to assist Sec. Rinck" is the headline in an American motor cycle paper.

Help!

A hood and screen is the latest gadget on a motor cycle. The crossing of Salisbury Plain in a gale during a London-Exeter trial will now lose its terror (!).

Twin and Single.

It is when passing through congested traffic that one appreciates the large reserve of power provided by the big twin, but the single always will be popular while the fuel hill retains its present importance.

Sidecars in Holland.

We understand sidecars are not very popular in Holland.

Motor Light Cavalry.

We may yet have motor cycle light cavalry. In Africa the motor mounted infantry did excellent work.

Chance for Inventors?

Camouflage experts have not yet invented a way to make petrol-less motor cycles look like push-cycles.

S.P.C.M.C. Wanted.

Recently we saw a medium-powered twin outfit with six adults up. A case for the Society for the Prevention of Cruelty to Motor Cycles.

Motor Cycling in Ireland.

The Irish Cyclist and Motor Cyclist reports that roadside repairs were a feature of St. Patrick's Bank Holiday. Repairs to what? Do they still motor cycle on holidays in Ireland?

Petrol after the War.

The Petrol Economy Officer recently stated it was probable, after the war, that everyone requiring petrol will be called upon to show good cause why he should be permitted to use it.

The Military Motor Cycle.

The war has proved the value of the motor cycle, but old motor cyclists, with visions of the Army type push-cycle in mind, groan when they think of a Mark ? military motor cycle.

Hot Air Turbine.

We remember a hot-air turbine, supposed to have been invented by a Coventry man, being exploited by a company promoter in Canada. Now is the time to prove the merits of the invention. Would the Government allow us to use air without restrictions?

A Bijou Side Delivery Car.

A Western American trader has built a light side delivery car for his Indian flat twin. This engine is smaller than any twin in this country, but then Autowheels are harnessed to runabouts in the States.

Despatch riders who had an exciting time during the Cambrai offensive, but came through unscathed. Reading from left to right: Cpls. A. W. Byers, A. K. Byers, Cyril Mercer, and F. J. Palmer. The machines are Douglases and a Triumph.

COMFORT IN SIDECARS.

A Suggestive Criticism of Prevailing Practice in Sidecar Body Construction.

A pre-war model sidecar on the road. This photograph illustrates several of the points mentioned in the accompanying article, including lack of weather protection and convenient accommodation for the passenger's arms.

ALTHOUGH sidecars have long been the most popular means for the motor cyclist to carry an extra passenger, and no casual criticism will injure their prospects for the future, no one has yet suggested that there is no room for much further improvement both in chassis and body design. Chassis design suffers, if anything, from over discussion, and the liveliness of interest in the subject has been frequently emphasised by the pages of *The Motor Cycle*. Bodies, however, seem to suffer from the attention paid to chassis, and as a result such progress as they have made seems to be more of an accidental than a deliberate nature.

There are three main points that make or mar a sidecar body, or rather, perhaps, three items under the one main point of *size*. These three items may be regarded as (1) width, (2) length, and (3) depth, but before we can consider any of them we must ponder over the ultimate end to which these are but means.

Riding Position.

Before we can decide upon the essentials of a sidecar that will give an ideal riding position we must know what that position is and what individual factors go to its determination. These factors are three in number, and consist of two angles and what may be most simply described perhaps as a support.

The first of these two angles is that between the back and thighs, and is, of course, determined by the angle made between the back of the sidecar upholstery and the seat, while the second is that between the thighs and the remainder of the leg, being determined by the angle at which the sidecar seat is tilted and the height of the seat above the floor, as well as the length of the whole body of the sidecar. The "support" is really another angle, but the angle aspect is less obvious than it is in the other two cases. I refer to the angle of the neck that follows as a consequence of the shape of the sidecar back, and depends on the presence or absence of a support for the head of the passenger when he is sitting in the position tha follows naturally from th general construction of th sidecar.

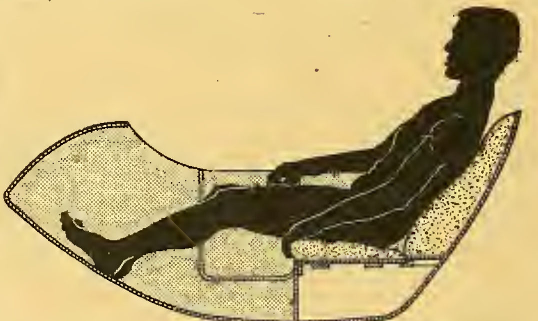


Fig. 1.—The lounge type of sidecar, very comfortable except for the passenger's neck. The passenger must either look at the sky all the time or risk a severe stiff neck.

Accommodation for the Arms.

There are, of course, othe items to be considered whic are of some importance. Fo instance, the accommodatio provided for the arms is point that often receives onl very casual attention in to many sidecars. Certainl passengers differ in thei tastes, and, while som would prefer to have thei arms hanging over the sid of the car, others like t have their arms comfortabl ensconced at their sides— please note that I sai comfortably ensconced, n jammed in as if in imitation of the proverbial sardin

Size of the Body.

All of which requirements lead us logically to o important item—the question of the size of the bod Ignoring freak designs intended to stow away ma passengers, I can honestly say that I have seen ve few really roomy sidecar bodies that have made th appearance on the open market. The type to whi I refer is shown in fig. 1, and it will be seen th not only does this design provide plenty of leg roo but it also allows the lazy passenger to let his a go wherever they will. He may ride with his a comfortably along each gunwale, fold them, or may keep them out of sight and out of the cold so where in the region of his waist. And above all and this is my point—in all these evolutions he ne loses his dignity nor appears to be aping an acrob A Birmingham firm has achieved these ideals a sidecar that gives a more or less recumbent posit —and a very comfortable position at that.

Width of the Sidecar Body.

The first item in the matter of size of the b is that of width—the main detail in the passeng comfort for which it is resp sible being the disposal of arms. I have already d with this, so will say no m other than to summarise matter as follows: The b should be of sufficient widt allow the arms of the passe to come comfortably in should he so desire it—as certainly will in bad weat A body that will allow of will automatically allow c certain amount of mover and will prevent that wedge

Comfort in Sidecars.—

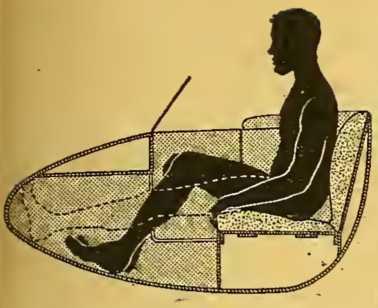


Fig. 2.—The type now fortunately almost obsolete, about which the less said the better. Note the strained angle of the passenger's back and legs, and the very efficient "shin barker." Also the equally uncomfortable alternative position shown in dotted line.

sensation that comes from riding in the majority of sidecars on the road at the present time. I have noticed, however, that where a sidecar concern is responsible for both body and chassis, the general result is in every way superior to the efforts of smaller firms who are body makers who buy chassis or chassis makers who buy bodies.

Length of Body.

Much, of course, depends on the length of the passenger, and as a body cannot very well be made of variable length a compromise is necessary. However, in fig. 3 the body is longer than normal, and adjustable footrests are provided. Who has not felt the lack of some support for the feet when on a long journey in a sidecar, especially if the roads are a trifle on the bad side, so that some pressure may be maintained without effort against the padded back?

The length of the seat depends on that of the body as a whole, and it also plays its part in determining the angle at which the legs will naturally lie. Hence I shall refer again to this point when dealing with the angles already mentioned as providing the keynote of sidecar comfort.

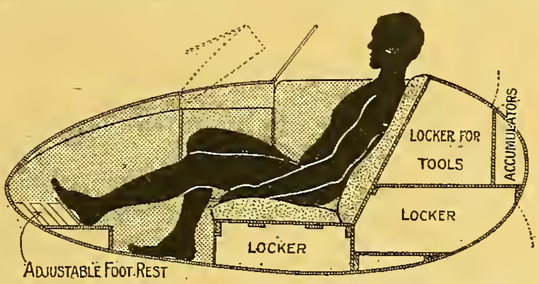


Fig. 3.—A suggested design embodying the ideals spoken of in the accompanying article. The main features are comfortable riding position, adjustable footrests (after the same lines as the adjustable footboards in a rowing boat), and ample weather protection.

Depth of the Body.

Depth is perhaps the point on which most divergence of opinion exists. Some passengers like to feel themselves *on* the vehicle that is carrying them, while others prefer to be in it. Personally, I am all for the latter, though I cannot say I am in entire agreement with carrying the practice to such lengths as Mr. Pemberton Billing has done in his car (illustrated in *The Autocar* of October 6th, 1917). Nevertheless, both the designs shown in figs. 3 and 4 ensure that the passenger is well protected, while that in fig. 4 does not prevent a normal-sized passenger from travelling with both arms resting on the gunwale if he so desires.

One part of the body in which the question of depth is often overlooked, though it is of vital importance at this point, is at the beginning of the fore-deck, at the point level with the hinge of the door. My shins still show the marks of wounds received while travelling (before November 1st last) in a late 1917 model. The cross-sectional views of the two suggested designs (figs. 3 and 4) at this point will show that my wounds have taught me something. No ordinary passenger would bark his or her shins in getting into either of these 'buses, no matter how great the hurry.

The Angles.

And now for these angles. Let me say at once that I have no intention of stating definitely what they should measure. This is impossible if passengers insist on varying in size, and in the absence of any evidence to the contrary we must assume that they will. However, the illustrations emphasise the importance of these angles, and also give some idea of what they should measure when the passenger is an average-sized human being. As regards the "neck angle," notice that the support at this point in figs. 3 and 4 is quite different from that in fig. 1.

Of course, the most important angle of all is not one of these already mentioned, but is that made by the back of the sidecar (inside, of course) with the horizontal. Taking a straight line from the top to the bottom of the back—the upholstery itself will not be a straight line—this should generally give an angle of about 80° with the horizontal. The angle between the floor and the back is not of great importance, although it might appear to be so at first sight. The position of the passengers' legs and the angle at which they rest depends, as already shown, more on the position of the seat than on anything else, and the angle between floor and back has most influence on the appearance of the sidecar.

The provision of a false floor is a minor detail that may be retained or dispensed with according to individual tastes. If retained it would make a useful locker.

While not such a fundamental matter in the actual construction of a sidecar the upholstery has a large part to play in deciding the passenger's comfort—or lack of it. There are the two painful extremes, one

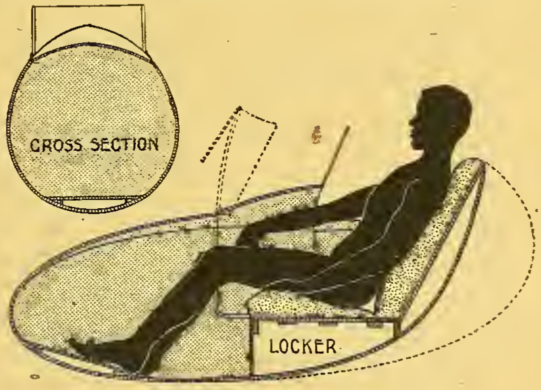


Fig. 4.—The weather protection in this design is made less prominent than in fig. 3, but it is well looked after. This body could be very easily streamlined by the addition of a bulbous back as shown by the dotted lines. (Inset) A cross sectional view of the two designs shown in figs. 3 and 4. It will be seen that there is plenty of room for the passenger's knees in all likely positions.

Comfort in Sidecars.—

of which bulges out into the small of the passenger's back but gives no support to any other part of it, and there is the other extreme that meets his shoulders but ignores the presence of any other part of his back which is consequently unsupported. Of the two the first is certainly the worst, but the other is most unpleasant when it has to be endured for anything like a long distance without a break.

The upholstery should have a gentle curve to meet the small of the back and another to come somewhere in the neighbourhood of the shoulder blades or neck, the most perfect example of this work that I have yet seen being in the Palladium car, to ride in which is a real treat.

The Suggested Designs.

And now a word as to the suggested designs. Of course, they are open to criticism, and criticism will be welcomed, but they do, I think, obviate some of the most glaring defects I have mentioned. As regards their general outlines, though this is made streamline to satisfy the modern critical eye, they are not intended as essentially speed designs.

One of the most desirable of all points—the protection of the knees—is amply provided for by the provision of a lid, hinged near the door, which opens and closes upwardly while the door is being used. This lid is a very valuable asset, and I can never understand why it is not more frequently fitted to sidecars, as the addition can be very easily carried out. Screens and hoods are quite minor details.

As regards the size and weight of the two bodies illustrated, that shown in fig. 3 would be somewhat above the normal, of course, but the other may be quite easily kept within reasonable limits, and an aluminium body of this type might be even lighter than the ordinary type built of more common material. But, of course, that would mean expense which is another question, depending not so much, perhaps, on the driver's taste as on the identity of the passenger.

RAMA.

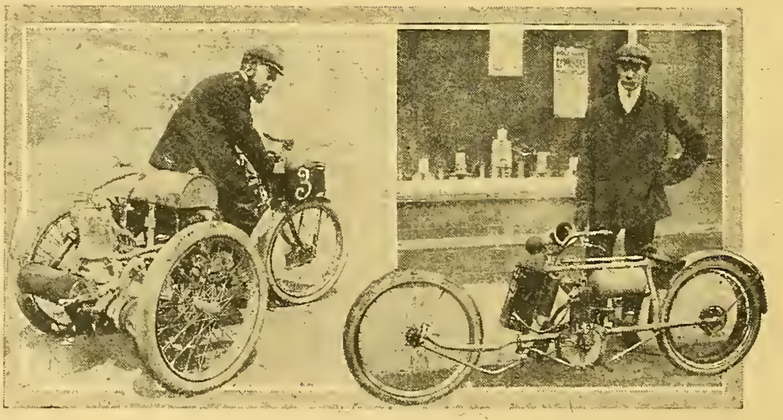
* * *

Circumventing the Security Bolt.

Why and How Ordinary Security Bolts may be Discarded.

SECURITY bolts are often a cause of endless trouble, and in these days when tubes are generally fitted complete with a valve security, bolts are quite unnecessary. If the rim be drilled to take them, however, provision must be made to prevent water entering through the holes when they are removed, otherwise the outer covers will soon become rotted round the tread, and tyre troubles are certain to ensue. Here are a few hints for the rider who has decided to remove his security bolts and trust solely to the valve security—a very wise decision.

The simplest plan for keeping water out of the bolt holes is to make three or four turns inside the rim with insulation tape, drawing the tape up as tightly as possible, and seeing that it securely covers the bolt holes. This lining of insulation tape effectively prevents a cover creeping, quite independently of the valve security, and when the cover is ultimately removed it will be found that the bead is firmly stuck to the tape. The Leosco tube protectors answer the same purpose, but are probably difficult to obtain at the present time. It may be added that this insulation tape tip is a good one to carry into practice if trouble is experienced through a slack cover creeping.



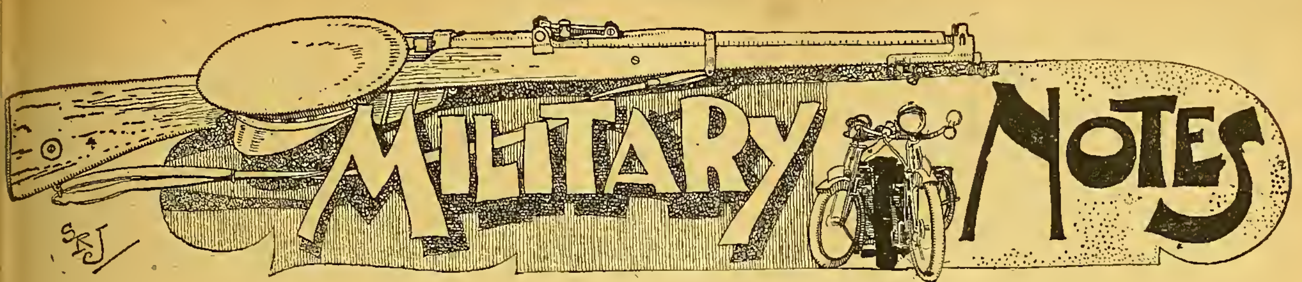
CURIOSITIES IN MOTOR CYCLE DESIGN.

(Left) A motor tricycle used about fifteen years ago as a pacing machine for track cyclists. (Right) This motor cycle was seen running on the road in 1909. The frame structure will strike many as novel, although a somewhat similar design of machine was produced by the James Cycle Co. in 1908.

Perhaps the most effective way, though the most troublesome one, of preventing water entering through the security bolt holes is to solder a small piece of tin over each hole, but a simple and equally effective method is to utilise the original bolt. Place the bolt with its rubber protector downwards on the floor, and hit the end of the bolt a smart tap with a hammer. This will cause the central pin, complete with its head, to fall through the plate carrying the rubber protector, and, by separating the two, one is then in possession of the centre pin. This should be placed in the hole it is to occupy, and hammered smartly a few times to cause it to make a seating for itself in the rim. It is then fixed in position and drawn up tightly on the water-excluding leather washer, after which the outer cover is replaced. Should the head of the bolt be found to protrude inside the rim much further than the heads of the spokes, it should be filed down.

It may be added that if it is found on removing a cover that water has entered through the security bolt holes, something should be done at once to prevent it, and the cover thoroughly dried before replacing.

CHINOOK.



The Full Stop to a Sore Point. How a D.C.M. was Won.

THE ARMY BILL.

THE Army (Annual) Bill provides for five million men, excluding those in India.

* * *

CIVIL EMPLOYMENT FOR OFFICERS.

A SPECIAL department is being inaugurated by the Ministry of Labour to find civil employment for officers on relinquishing their commissions.

* * *

BILLETING THE W.A.A.C.'s.

WHEN the necessary accommodation cannot otherwise be obtained, the Army (Annual) Bill grants the power to billet women enrolled in any of the auxiliary corps. This applies to the W.A.A.C.'s, the Wrens, and other women's units.

* * *

DISCHARGED MEN.

DR. ADDISON (Minister of Reconstruction) states that arrangements have been made with a large number of trade unions and employers' organisations, whereby discharged and demobilised men will be specially trained for certain industries, such as engineering, aircraft, and the leather and furniture trades.

FAMILIAR NAMES.

WE recently had a visit from J. Oliphant, who before the war was well known as the rider of a Premier. He is still attached to an M.T. depot in the Metropolitan area, where he is serving as a tester.

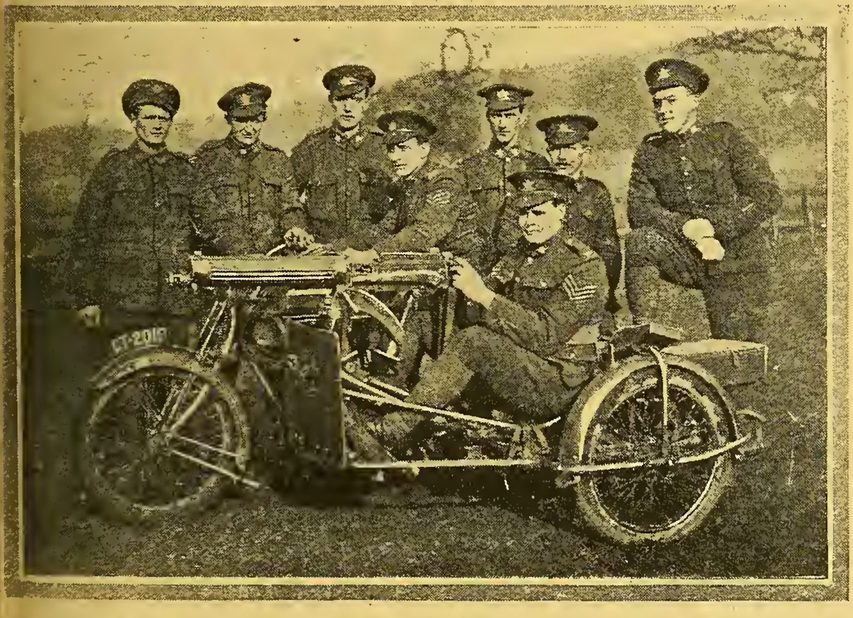
He recently came across Sidney Garrett, who is now a lieutenant in the R.F.C., and stationed at an aerodrome some distance from town. Garrett, who recently obtained his wings, used to ride a Regal-Green.

Oliphant also lately saw F. Guiver, who is now in the Aeronautical Inspection Department.

* * *

LETTERS ON THE "CUSHY JOB" QUESTION.

A GREAT deal of correspondence has reached us on the subject of the A.S.C., M.T., and the danger encountered in carrying out work with that corps. It is quite impossible to publish the letters; and even if portions only were extracted, it would be weeks before we could utilise those already received. The subject seems to be an everlasting bone of contention; and as nothing can be gained by a resuscitation of a subject which was thoroughly discussed some months ago, we have decided to terminate the correspondence and to publish no more letters on this matter.



N.C.O.'s and men of the first Canadian Motor Machine Gun Brigade undergoing a Clyno course at a M.M.G.S. depot.

MENTIONED IN DESPATCHES.

THE names of the following officers, who are well known in the motor cycle world, have been brought to the notice of the Secretary of State for War for valuable services rendered in connection with the war:

Temporary Major F. H. Bale, A.S.C. Major Bale is the son of the London manager of the Swift Motor Co., and was closely associated with Swift motor bicycles prior to the war.

Temporary Second-Lieutenant E. W. Walford, R.F.C., Special Reserve.

* * *

WINNING THE D.C.M.

ARTIFICER-CPL. A. MACKINNON, D.C.M., sends a few interesting details of his exploit which earned him the D.C.M. His disregard of danger, the *London Gazette* said, enabled valuable information to be delivered at a time when all other means of communication had been interrupted.

Cpl. Mackinnon says: "I thought perhaps my little experience with a W.D. Triumph might be of interest to you. I was in the Dunkirk affair, and, as the papers told you at the time, we had rather a hot time of it. I managed eight trips through Fritz's barrage, and it was some barrage to put up. Motor cycles were for the time the only means of communication, the shells destroying other means as fast as they were put down; such conditions make me appreciate the reliability of this mount. I had no trouble whatever until my eighth journey, when I 'clicked.' An H.E. got me well in line, and when I gathered myself together and eventually found my bicycle, which was in the opposite ditch to myself—it was as black as your hat at the time, and I dare not strike a light—you can guess there was a small percentage of 'wind up,' but—would you believe it?—it started on the first kick, which was luck indeed, for I do not believe I had another kick in me. Anyhow, off we went, both a bit wobbly, but with six miles in front of us. How I arrived there I do not know; things were a bit too 'flurry.' I better remember finding myself in hospital with a decent bit of the shell case finding a home in my thigh.

"After that, I was told, I had to be lifted from the machine, which was covered with gore—my own particular speciality. The trusty old mount had been hit in no fewer than seven places, one hit cracking the cylinder. However, here I am ready again for the next issue. The experience has made me the possessor of the D.C.M., the ribbon of which blends well with the Mons ribbon."

LETTERS to the EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

PRESSURE IN A TWO-STROKE CYLINDER.

Sir,—I shall be glad if any of the readers of *The Motor Cycle* could inform me of the conditions obtaining during the exhausting period in a two-stroke cylinder. A diagram in Dr. A. M. Low's admirable little book, "The Two-stroke Engine," shows the minimum pressure in the cylinder equal to the pressure of the atmosphere, but I have recollections of seeing it stated that the pressure at the end of the stroke is less than atmospheric pressure, due to the kinetic energy of the exhaust gases.

CHAS. ROBERTSON.

A PLEA FOR BETTER STANDS.

Sir,—I was greatly interested in the article appearing in your paper anent the above, and would like to say that I am in full agreement with your contributor's remarks *re* the inefficiency of present-day encumbrances, misnamed stands. But in my opinion the trouble will only be surmounted by a stand made of U section *pressed steel*, after the style of those fitted to Harley-Davidson machines. Why make stands with brazed members when those made of pressed steel are cheaper to make and stronger? The same may be said of carriers. These have an unhappy knack of fracturing near the lugs. They could be produced in *one piece* by making them also of pressed steel, quite easily accomplished and far more workmanlike.

L. V. MERLIN.

LADY MOTOR CYCLISTS IN THE BRITISH ARMY.

Sir,—One of the most vexing questions of the day is the man-power problem. Appeals are constantly being made for skilled men to serve in H.M. Forces, especially in the R.F.C. or the R.N.A.S. Whether the man-power of the country is used wisely or to the best advantage is a very debatable question.

In *The Motor Cycle* of March 14th, on the subject of women transport work in the R.F.C., you state that, although the women do their own running repairs, etc., the mud on their motor cycles is removed by mechanics. Surely, as the man-power question is so pressing, a mechanic can be put to better use! I understand these women are supposed to take the place of a man: then surely they ought to do a man's work, otherwise their employment is waste of time and money.

MECHANIC.

Hamble.

A POST-WAR IDEAL.

Sir,—I should like to say a few words about "A Post-war Ideal," mentioned by Mr. J. A. Jeapez in the issue of March 21st.

A large two-stroke would be quite satisfactory if designed correctly. For evidence of this, see the American Schickle 6 h.p. two-stroke single-cylinder, one of the most popular machines in the States, but vastly different from the poor specimens of indifferently lubricated, and often carelessly designed, engines, which, with a few notable exceptions, make up the horrid little spluttering "tup-tup-tup—trrrrr—hissss" 'buses to be heard and smelt in this country. Radco spring forks, however, can hardly be heavy enough for such a machine, and their design does not lend itself to a thing of beauty in the way of outline. Has Mr. Jeapez seen the new Mark II. Druid or the latest Yankee Reading Standard spring forks? He will like them both, I am certain, and, to my mind, the new Druid is perfection.

The general design of a machine such as the writer outlined in his letter would be very nice, and I think that he knows just about what a comfortable, handy, and speedy 'bus ought to look like, and I really cannot imagine a more delightful design, only that he might add a Schebler carburetter and twist grip controls to attain that height of perfection known at the Grahame White Flying School as "Simply I-T, old thing! what?"

Derby.

GEE WHIZZ BANG.

Sir,—I am pleased to see that Mr. Jeapez is looking for the same engine as I am—namely, a simple, economical, big-single two-stroke.

I believe the troubles of four-stroke single-cylinder combinations are due to uneven torque, which would be sufficiently improved by doubling the impulses. A flat twin four-stroke will do this, and give good engine balance as well, but it is a very expensive alternative to the two-stroke single in first cost.

"Chinook" has said, "Smooth torque does not matter, but good balance is all important." "A Tilter at Windmills," in March 21st issue, says exactly the opposite. I back the latter. What say others?

W. R. DEUCHAR (2nd-Lt., R.E.).

MAKING GAS CARBURETTER AND HOLDER.

Sir,—I am sending sketches of a conversion to an Amac carburetter, which I carried out myself in January of this year. The main body was made out of a solid bar of steel, but it would be easier to make it out of an old lubricator about 4in. in diameter. The cap was turned from the same bar, and has $\frac{3}{8}$in. holes drilled round it, about eight (see fig. 1). The plate is made a little larger than the cap, so that you can grip it to turn it. The gas is taken through a $\frac{1}{2}$in. gas pipe, which is tapered as shown. At first I tried a $\frac{1}{4}$in. pipe, but the engine would hardly keep the machine moving at full throttle.

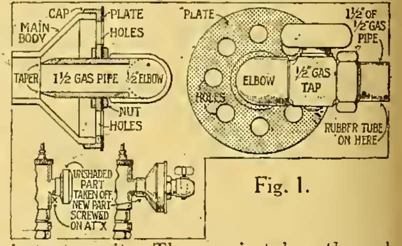


Fig. 1.

The conversion was carried out on a $2\frac{1}{2}$ h.p. Calthorpe two-stroke. It might be advisable to mention that a big pipe with the tap half on is better than a small pipe with the tap full on. The controls are worked in the usual way as with petrol, the fitting being screwed to the air intake. The bag (see fig. 2) is carried on the carrier as shown, and is 4ft. × 3ft. × 3ft. It is not inconvenient except on muddy roads. *All* the fittings are home-made, the bag being made of thin waterproof sheeting and machined together with double seams. The whole outfit cost about £1, and will take one for about eight miles on one half charge, as the bag is rather cumbersome when quite full.

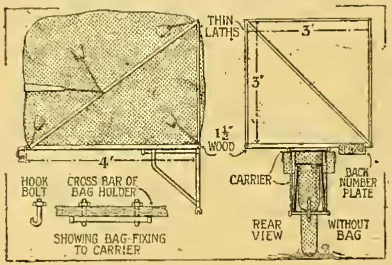


Fig. 2.

E. A. REYNOLDS.

AN IMPROVED TOOLBOX.

Sir,—In your issue of March 21st, page 270, I note the registered design of toolbox and number-plate over the initials of "W.H.B. (Dudley)."

This design, I should like to point out, was registered by myself in 1908, and is at the present time in use. This design of toolbox and number-plate was used by me in the April and July (1909) Quarterly Trials.

I should at any time, as a manufacturer, be pleased to make any arrangements with "W.H.B." regarding this fitment which would no doubt be to our mutual advantage.

A. H. HADEN.

SIMPLE TYPE CARBURETTERS.

Sir,—With regard to the suggestion in *The Motor Cycle* of March 14th for a floatless carburetter, it may interest your readers to know that I experimented with a similar arrangement about twelve months ago. I cut off the choke tube of my Triumph carburetter with a hacksaw, and sweated a piece of copper tube of the same external diameter in its place. To this I fitted an arrangement almost identical with that suggested by "Chinook," but found that the disc was much too large, so I gradually cut it down to about half the size, and arranged for the petrol to spray *above* the disc, which, to my mind, is a much better idea. I found the extra air very necessary, especially at speed, but the lever had to be very delicately handled. The consumption was improved from 80 m.p.g. to an average of 112 m.p.g. over several hundred miles. I was exceedingly pleased with this device even in its crude state, but was unable to complete my experiments, having been refused any further petrol. For slow running, fast work on the level, and hill-climbing, I found it an improvement on all the ordinary carburetters I had previously used. My machine is a two-speed Triumph. S. L. BURNARD.

Sir,—I have read with interest "Chinook's" article on the "Machine for the Multitude," especially his somewhat patronising admission that the two-stroke is capable of real service.

Although most excellent results are obtainable with a simple form of chain drive two-speed gear such as the Enfield, I feel sure that if this were incorporated with a further choice of two ratios in the final drive to the back wheel, not only would production costs be kept at a minimum, but the overall efficiency of the transmission would be higher than if a gear box were interposed.

"Chinook's" suggestion for a carburetter was anticipated in the "Roubeau" carburetter of about the year 1899 or 1900, which was almost identical in construction, but had an additional collar fitted for regulating the area of the air intake. No device for flooding was fitted or found necessary. This carburetter was made of the well-known Cothias metal, and sold at about 18s. I believe it was the first carburetter to be offered for sale as a separate unit.

In view of the efficiency of the modern Amac or Senspray carburetter, any retrograde step is to be deplored, especially as the saving per machine is only a matter of shillings.

I cannot agree with "Chinook" that the two-stroke is in any way an "affliction," and he himself acknowledges its wonderful capacity for withstanding abuse of every description, including full throttle running for a time, which would absolutely dry up the four-stroke under similar conditions.

The bane of the two-stroke has been the "petroil" system of lubrication, again an effort in the direction of cheapness. Given a rational oil feed to the vital parts as is employed in a two-stroke of almost household repute, not only is oil consumption reduced to a minimum, but wear of bearings is almost unknown.

I cannot but feel, from the tone of his article, that "Chinook's" experiences of an up-to-date two-stroke are somewhat limited, or he would not have indulged in such sweeping criticism.

The buying public is by no means devoid of appreciation for a sound article, and I venture to think that price will never be the sole deciding factor *apart* from quality.

B.E.F. LT., R.F.C.

ACCUMULATOR CHARGING.

Sir,—Referring to my article on "10,000 Miles with a Dynamo Lighting Set" in the issue of March 21st, I should be glad if you would publish the following correction. The paragraph towards the end of column 2 thus: "This was continued until the voltage per cell reached the value of, roughly, 2.2 volts . . . " should have read thus: "This was continued until the *charging* voltage per cell reached the value of 2.7 volts . . . ."

As published the sentence is vague, and it may lead your readers to a wrong impression regarding the accuracy of the tests.

Needless to say, in comparative tests such as the article dealt with, it is essential that identical conditions obtain during each test, so far as it is possible to repeat them, otherwise errors of measurement may completely mask the changes that are being looked for.

For this reason the charging of the cells before each test was continued until a perfectly definite condition of the electrical circuit was reached, as is indicated by the corrected sentence. This condition could be repeated as often as required. A.K.

Teddington.

ANOTHER LIGHTING PROBLEM.

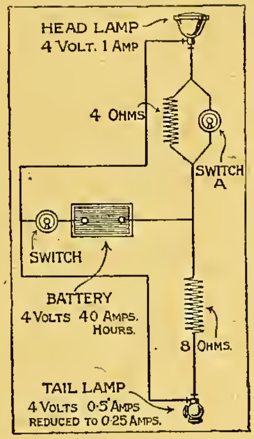
Sir,—Herewith is still another diagram of a wiring arrangement for a solo mount, which I hope Mr. Percy and others will find useful.

(1.) No arrangement of wiring will allow lamps of widely varying current consumption to be connected in series. The proper way to tackle the job is to place resistance wire in the circuits leading to the lamps. For the tail lamp four and a half yards of Eureka or platinoid wire, No. 24 s.w.g., will be required, which will give about 8 ohms resistance, and will reduce the current to 0.25 amp.

The head lamp will require four yards of Eureka wire, No. 22 s.w.g., placed in parallel with the wire to the head lamp, which will give a reduction of 50% with the resistance wire in use.

With the switch A closed, practically all the current passes through the copper conductor. With the switch open, the current is shunted through the resistance wire before reaching the head lamp.

It will be understood that the resistance wire should not be spread out in the way shown in the diagram, but should be wound round a piece of wood, with a small space between each turn.



If insulated wire can be obtained, it could be wound on a small bobbin, and would occupy a very small space indeed.

(2 and 3.) A 12 c.p. lamp would require a large battery, or else frequent charging would be the only alternative. A 4 volt 40 amp.-hour accumulator would be quite satisfactory. With a 4 volt 1.0 amp. bulb in the head lamp and a 4 volt 0.5 amp. (reduced to 0.25 amp.) bulb in the tail lamp, the battery would last for about thirty hours at one charge.

(4.) Any voltage where volts × ampères = 12.

(5.) A metal filament lamp (usually made of tungsten or osmium). A. A. MORRISON.

A CONVERTED SCOTT.

Sir,—Would Mr. L. S. Parker kindly say if his converted Scott has been used with a standard sidecar? If so, to what portion of the frame does he fit his upper after coupling; and are the results satisfactory when used as a combination?

The design is very interesting to a pre-war Scott rider, and I only wish that I had a Scott standard or converted (less the rotary valves) out here in Macedonia. At present I daily ride over a track, for the gradient and conditions of which, especially after rain, a Scott would be ideal.

Some weeks ago the roads were a foot deep in snow, and, until cars had made tracks, our belt-driven machines would not move through it. A chain-driven machine without mudguards would have filled the bill.

Of the two types of machines out here, the Triumph stands the work very well. But, apart from standardisation for replacements, etc., it is very far from the most suitable make that could have been chosen. The magneto is very much in the worst position; and after some time soon shows how non-waterproof it is, irrespective of its make.

The usual faults—soft rims and insufficient clearance (mudguard and crank case)—also advertise their presence. However, I do not think that there is any American machine on the European market which would stand the continuous gruelling to which ours are subjected, and remain in the condition and readiness for work that the Triumph does, with all parts and fittings complete.

Macedonia. G. H. DURSTON (D.R., R.E. Signals).

PISTON DESIGN IN TWO-STROKES.

Sir,—With reference to Mr. D. J. McDougall's letter in your issue of February 7th on the subject of piston two-stokes, I shall be greatly obliged if he will inform me in what way the inertia of the exhaust gases passing out of the exhaust port causes a partial vacuum in the cylinder.

A two-stroke piston with a badly-designed deflector actually traps part of the exhaust charge, because of the reluctance of the exhaust gases to leave the cylinder after the exhaust pressure has fallen below the compression in the crank case.

If a partial vacuum existed at the end of every exhaust stroke it is quite obvious that we should have a fairly well-scavenged engine, but well-scavenged engines have resulted more from attention to the design of deflectors in conjunction with certain crank case pressures than by any vacuum effects produced by the exhaust gas. J.D.

Birmingham.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—We motor cyclists attached to the R.F.C. would be glad if we can, through the medium of your paper, ventilate our dissatisfaction at being classed as *non-technical* under the new R.A.F. We feel that, as we do all overhauls and running repairs ourselves, we should be put on the same footing as M.T. drivers, who have proper fitters, etc., to do their overhauls. We feel sure you will agree with us that we should be classed as technical men and get the higher rates of pay and promotions.

AIR MECHANICS.

Sir,—*Re* the mustering of motor cyclists under the non-technical branch of the new Air Force, I really think an injustice has been done to us to grade us in that way, when M.T. drivers are included under the technical branch. The majority of us cyclists do all our own repairs and complete overhauls, whereas a M.T. driver generally has a fitter to do his. The least the authorities could have done would be to classify us D.R.'s instead of privates, considering the rough job we have, as it is very rarely that we get any time off. Also why should we not have some distinctive badge to wear, the same as other motor cyclists in other corps? I am sure, if so influential a journal as yours would put it forward, it would be taken up. This is the view of practically all the cyclists in the corps to whom I have spoken. We do not wish to grouse, but would appreciate a little appreciation. OLD READER.

Retford.

THE SINGLE V. THE FLAT TWIN.

Sir,—I have been very much interested in the discussion in the correspondence columns of *The Motor Cycle* on the relative merits of the 2¾ h.p. flat twin and the 4 h.p. single for despatch riding Overseas.

After a personal experience of both types during almost three years of active service in more than one country Overseas, I consider the 2¾ h.p. flat twin *the* machine.

I rode a 2¾ h.p. in the early part of the war, and it was an absolutely no-trouble mount. Later I had a 4 h.p. single, and then began to experience the delights of handlebars snapping off, mudguards and carrier breaking (although the only thing the latter carried was a spare belt).

Now I ride a 2¾ h.p. flat twin again, and am quite satisfied. The tools remain packed away in the tool bags. The hubs do not fill up with liquid mud and then seize solid. The machine may stand out without cover in hail, rain, or snow, and still start up by pulling over the back wheel a quarter turn. I have fitted Terry's spring links to the front forks: these are a great improvement for the "roads" out here. It is a wonderful little engine, and its even torque does not try one's nerves as a thumping single does. One can appreciate a lightweight after one, wearing a gas helmet, has ridden with a weighty single into a shell hole in the road.

I might say that I am over twelve stone in weight, and as I am attached to a field ambulance this sort of work is a severe test for any machine, as the roads are indescribable after an advance. The only improvement I could suggest for my little machine is a hand-controlled clutch.

Regarding inverted levers, I am very glad that my machine is not fitted with that type of lever, as I know from bitter experience how liable inverted levers are to catch any dangling chains or ropes when riding in the dense traffic of all descriptions here.

I may say that I am not connected with any motor cycle firm except as a potential *après la guerre* buyer of the 2¾ h.p. flat twin. H. HOPKINS, M.T., A.S.C.

FUEL LOSS AT CARBURETTER.

Sir,—I am indebted to a correspondent for drawing attention to an error in calculation of the velocity of the induced gases through the induction pipe. As far as the article itself is concerned this error does not interfere with the context, but for the benefit of those who have not made the necessary correction I give the following:

Let t = time taken to perform induction stroke in seconds

$$= \frac{60}{\text{R.P.M.} \times 2} = \frac{30}{\text{R.P.M.}} \text{ secs.}$$

v = volume of gas passing during induction stroke.

a = area cross section induction pipe in square inches.

V = velocity of gases through induction pipe.

We have then the condition that the gas travels $\frac{v}{a}$ inches in t seconds.

$$\therefore V = \frac{v}{a} \div \frac{30}{\text{R.P.M.}} \text{ inches per second.}$$

$$= \frac{v \times \text{R.P.M.}}{a \times 30} \text{ inches per second.}$$

$$= \frac{v \times \text{R.P.M.}}{a \times 360} \text{ feet per second.}$$

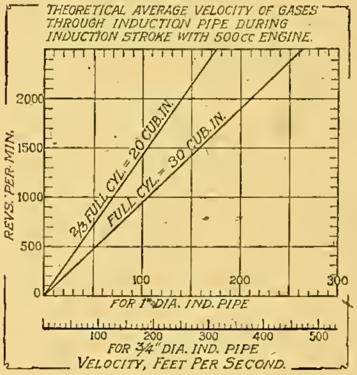
We have now a formula suitable for calculating the speed of induction gases for any volume, area, or r.p.m. figure.

In the example referred to we had $v = 20$ cubic inches, $a = .7854$, and R.P.M. = 1,200. Substituting these we have

$$\frac{20 \times 1{,}200}{.7854 \times 360} = 84.8 \text{ feet per second.}$$

This figure is approaching 60 m.p.h. Imagine a motor cyclist at this speed riding into a solid wall and you have some notion of what happens to the induction gases when the inlet valve closes.

To show the influence of r.p.m. and size of induction pipe on velocity of gases the curves shown have been plotted.



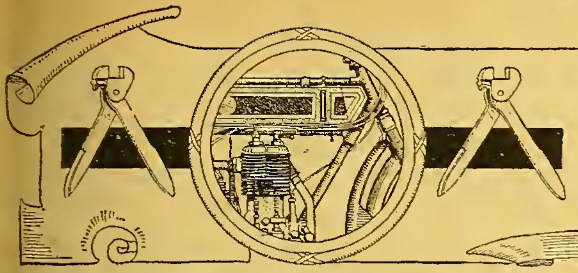
A leaflet published by Messrs. Prices' Co., Ltd., entitled "Miles per Gallon (Notes on Fuel and Oil Economy)" has been forwarded to me. In this it is shown that the theoretical value of the velocity of gases through an induction pipe of ¾in. internal diameter may rise to as high a figure as 200ft. per minute in the case of 500 c.c. engine running at 1,800 r.p.m.

A point of special interest is, to quote the leaflet, that "practical tests have shown that 10% to 15% improvement in consumption can generally be obtained by the simple expedient of converting plain jet holes into annular openings."

ENGRO.

SUMMARY OF CORRESPONDENCE.

The Palmer Tyre, Ltd., write us to the effect that they have received many applications for their "Map Books" and also orders for tyres (with cash enclosed), but no names and addresses given. Will those readers who have received no answer to their communication kindly write again?



TECHNICAL TERMS.

SOME REMARKS ON VARIOUS TERMS USED, AND OFTEN WRONGLY USED, BY MOTOR CYCLISTS.

The meaning of certain technical terms is far from being always correctly understood, and the following series of articles by "Rama" is intended to elucidate in simple language their individual meaning. It is assumed throughout the series that the reader is acquainted with the working of the motor cycle. Discussion on any interpretation of these terms which may be at variance with the usual ideas of our readers will be welcomed. (*The first article of this series appeared March 7th.*)

II.—THE VARIOUS KINDS OF EFFICIENCIES OTHER THAN THERMAL.

IN my last article I dealt with the term thermal efficiency, and explained how this was a factor very much depending on the compression ratio of the engine under observation. There are, however, other efficiencies in common use that, like thermal efficiency, are often wrongly described.

Mechanical Efficiency.

Mechanical efficiency is a term that is perhaps less often subjected to abuse than are most of its kind, but it may, all the same, pay for a little explanation. Briefly, the ratio of the amount of power put into any moving part to the amount that is given out is known as the mechanical efficiency of that part. Thus a certain pressure is exerted on the piston of any reciprocating engine during its power stroke, and that pressure should give out a certain power at the crankshaft—a power that may be easily measured and simply expressed in terms of horse-power. Now if the power actually given out is what calculation would lead one to expect, the mechanical efficiency of the engine would be described as perfect—in other words, of 100%.

When dealing with engines the consideration of this matter involves the use of two terms that in themselves help to explain the main term we are now considering. The first of these two subsidiary terms is *indicated horse-power*, and the second is *brake horse-power*.

Indicated Horse-power.

Indicated horse-power may be calculated from the following formula $\frac{PLAN}{33{,}000}$ in which P is the pressure per square inch on the piston through the whole working stroke (and is often described as the mean effective pressure and written m.e.p.) measured in lbs. per square inch; L is the length of the stroke in feet; A is the area of the piston in square inches; and N is *the number of power strokes* per minute (not the number of revolutions, notice). 33,000 is the number of foot pounds per minute that are taken as the equivalent of one horse-power—a point that will be dealt with more fully in a later article.

There is no need to enter into any full examination of this formula, but it may perhaps be well to point out that the product of P and A will give the total pressure on the piston throughout the firing stroke, and that in ordinary petrol engines at the present time the m.e.p. is generally in the neighbourhood of 80 lb. per square inch. We will assume that an engine has been calculated by means of this formula as likely to yield 5 h.p.—that is to say, that if it actually gave 5 h.p. its mechanical efficiency would be 100%.

Brake Horse-power.

But such an achievement is never realised, and another test is made to ascertain what power the engine actually does yield. This is the measurement of the brake horse-power, and is carried out by means of an instrument known as a dynamometer which records the actual power given off at the crankshaft, also in horse-power. Dynamometers have been frequently illustrated in *The Motor Cycle*, and so there is no need to describe the instrument now.

The dynamometer we will assume in the case of this particular engine gives a reading of 4½ h.p.—in other words, .9 of the indicated or calculated h.p. The engine would therefore be said to have a mechanical efficiency of 90%.

Another way of looking at this matter would be to regard the ½ h.p. lost as the power required to turn the engine itself. Thus an engine entirely free from friction would have a mechanical efficiency of 100%—an ideal that, according to all the accepted laws of motion, will ever remain unattainable.

Other parts of a car or motor cycle may be said to have a mechanical efficiency in just the same way. Thus a gear box requires a certain amount of power to drive it, so that while the drive from the engine to the gear box may be, say, of 5 h.p., the drive after it leaves the box may only be of 4.5 h.p. The box has thus absorbed .5 h.p., so that its efficiency is 90%, as it has absorbed 10% of the power supplied to it in passing that power along. Similarly, all parts of the transmission have this propensity for absorbing power, and the amount they absorb, or their mechanical loss, is of great importance when one is trying to get the very last ounce of power out of a machine.

The average efficiencies of the various popular types of transmission may be given approximately as follow:

Chain, 98%; belt, 85%; shaft, 90% (the shaft is lower than the chain as a result of the right-angled turns in the transmission system which it necessitates).

Technical Terms.—

Thus, it will be seen that the actual power that reaches the road wheels of a motor is very much less than that that should be available from the pressure that is exerted on the piston during the power stroke, and is also considerably less than that given out at the crankshaft. The average efficiency of a complete motor cycle chain drive three-speed transmission system (*i.e.*, the ratio of the power given off at the crankshaft to that which reaches the back wheel) is about 90% on top gear and about 75% on the other two gears.

Volumetric Efficiency.

This is an entirely different matter from either of the two efficiencies that we have already discussed, and may be defined briefly as the ratio of the charge taken in by an engine on its suction stroke to the charge it ought to take in. Thus an engine of 500 c.c. swept volume or capacity should theoretically take in on each suction stroke 500 c.c. of mixture. Actually, however, the amount will be in the neighbourhood of 400 c.c., meaning a volumetric efficiency of 80%.

It should be obvious that while the volumetric efficiency has an important bearing on the ratio of power output to capacity it is quite a mistake to speak of the volumetric efficiency of an engine as the ratio of power output to capacity, yet this mistake is one of very common occurrence among those who might reasonably be expected to know better. A simple unequivocal name for volumetric efficiency is "pumping capacity."

The main questions involved in designing an engine to give a high volumetric efficiency are the design of such details as induction ports, inlet valves, and valve timing, etc. The question of exhausting the burnt charge has, of course, also an important bearing on the matter, as fresh gas cannot be introduced into a cylinder until the used up charge has been removed, and a high scavenging efficiency is almost as vital as a high induction efficiency to secure high volumetric efficiency.

SIDECAR WHEEL SPRINGING.

A Dutchman's Original Wheel Springing System.

HOLLAND is not a country from which one expects many radical improvements in motor cycle design. Mr. C. H. Bouvy, of 50, Noord Einde, Delft, however, sends the accompanying photographs of a sidecar wheel springing system he has patented, and we quote his own description as follows:

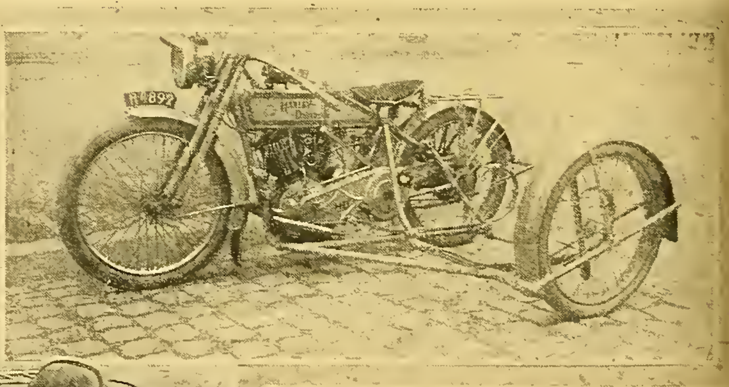
"As can be seen from the photographs, the wheel of the sidecar is fixed to the frame by means of a pivoting fork, which surrounds the wheel and slants upwardly, the frame being supported at the wheel side by a pin which extends from fork and floats between helical springs enclosed in a tube that extends upwards from the frame. By this arrangement the wheel is entirely surrounded by the fork, and is thus prevented from slipping.

"The tube enclosing the helical springs may be adjusted upwards and downwards for the purpose of regulating the height of the sidecar in relation to that of the motor cycle, whereas the tension of the springs may be adjusted likewise.

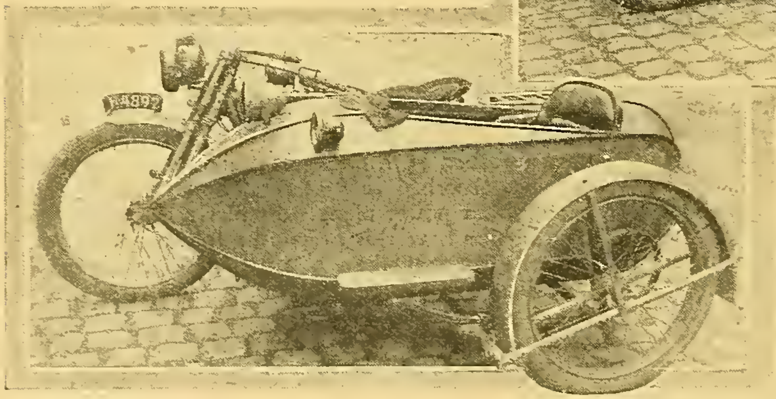
"By the peculiar construction of the pivoting fork, slanting upwards, a low and strong frame is obtained, the tubes of which are all in one plane, without bends, with the exception of two portions bent in order to reach the fastening lugs of the motor cycle."

In the opinion of the designer, this springing system would cost little more to manufacture than the ordinary sidecar chassis. He also assures us that he has experimented quite exhaustively in the matter, and has actually tested this design for some 3,700 miles, and has obtained complete satisfaction from it. Mr. Bouvy mentions the fact that he is willing to negotiate for the sale of the patent, and would be pleased to get in touch with any English manufacturer who is interested.

The whole scheme certainly seems to contain possibilities, and we see no reason why it should not give every satisfaction in service.



The body of the sidecar removed to show construction of chassis.



The clean design of the sidecar is a feature which immediately makes appeal to those whose inclinations are in the direction of a "sporting" outfit.

QUESTIONS & REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Record Speed.

I should be very grateful if you would tell me: (1.) What is the British record speed of a motor bicycle on the track? (2.) Who made that record and where? (3.) What type of machine was used?—J.G.

(1.) The fastest speed accomplished officially by a motor bicycle is 93.48 m.p.h. (2.) The rider was Sidney George, who accomplished this speed on Brooklands Track on May 2nd, 1915. (3.) The machine was a two-cylinder eight-valve Indian.

A Flooding Carburetter.

Would you kindly give me your advice how best to remedy the following defect in my Junior Triumph? If the machine is at a standstill, with the petrol turned on, the petrol drips from the float chamber of the carburetter, apparently through the gauze and round about it.—A.C.S.

The trouble is probably due to a piece of grit on the needle valve seating. If the needle is lifted off and pressed down on its seating, and at the same time turned round between the finger and thumb, this may clear the obstruction.

Electric Lighting with a Dry Battery.

I have a 6 h.p. Campion-Jap sidecar outfit. The head lamp fitted to the motor cycle is an F.R.S. with an acetylene generator. I have procured a Hellesen battery and an F.R.S. adapter. I should like to know whether you think it advisable to run the head lamp and the sidecar lamp from this battery, and, if so, the best means of doing it. How should I connect up the wires?—W.J.H.

You will be putting rather a heavy strain on a dry battery if you use it for the purpose of lighting two lamps. If, however, you wish to make the experiment, you may use two bulbs, the sum of whose voltages is equal to that of the battery, and wire them up in series; or you may use two bulbs, the voltage of each of which is the same as that of the battery, and wire them up in parallel. Electric lighting for both sidecar and solo machines has been dealt with in *The Motor Cycle* of December 27th, copies of which can be obtained on application to our publishers, Messrs. Iliffe and Sons Ltd., Tudor Street, London, E.C.4.

Free of Duty Petrol.

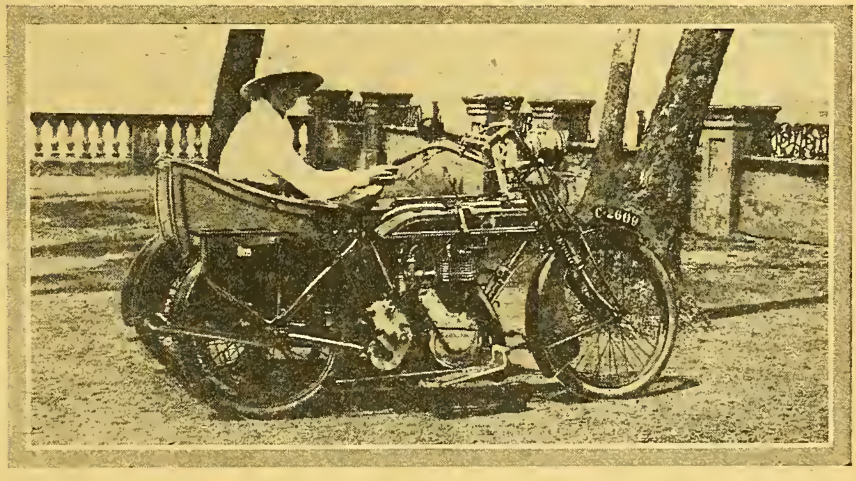
I have been doing voluntary ambulance work on air raids for the last three years, and paid for my own petrol, etc. The Petrol Committee have allowed me a permit of four gallons for two months, but it is not duty free. Should I not get this duty free? Other ambulances get petrol free, one shilling an hour sustenance allowance, and one penny a mile tyre allowance. I have to pay for my own petrol and the tax on it. Also shall I have to take out the local taxation licence for the year? Am I permitted to ride out on my machine when there are no raids in progress without fear of conviction? Also am I allowed to take out my wife and child for the benefit of their health once a week?—T.E.P.

Yes; certainly you should get petrol duty free for this purpose, and we should recommend you to communicate with the Petrol Controller's Department, 19, Berkeley Street, London, W.1. If the machine is used solely for ambulance work you will be able to get a refund of the licence at the end of the year. If, however, you use the machine for other purposes, then, of course, you are liable, not only for the local taxation licence but also for the petrol duty. Free petrol will only be allowed to you if you are driving an ambulance, but would probably not be allowed in the case of a motor cycle used in connection with ambulance work. You are not allowed to take out your wife and child or use motor spirit or gas unless you are using it for one of the purposes mentioned under the Motor Spirit and Gas Restriction (Consolidation) Order, 1918.

Petrol Permits and Licences.

(1.) Shall I be allowed to use my motor cycle and sidecar (registered in my name) while on leave? If so, (2) where do I apply for a petrol permit? (3.) Will a local garage supply me with petrol should I obtain a permit? (4.) Will it be necessary for me to take out ordinary Revenue and driver's licences (for ten days), both having run out in 1916?—F.H.W.

(1.) If you are expecting to obtain leave after service Overseas you should be successful in obtaining a petrol permit. (2.) You should apply to the Petrol Controller, 19, Berkeley Street, London, W.1, stating the full circumstances of the case, and the day on which your leave is expected to begin. You should make application about three weeks before you need the permit but, if this is impossible it would be far better if you could make a personal application, as otherwise you probably would not get the permit until it is too late to be of any use. (3.) Having obtained the permit, you will have no difficulty in getting petrol at any ordinary garage. (4.) You are liable for both the local taxation and driver's licences.



A 3½ h.p. Premier combination owned by Mr. N. H. M. Ferguson, of Colombo, who reports a good opening for motor cycles in Ceylon.

Petroil Lubrication.

Being the possessor of a 2¾ h.p. single-gear two-stroke, I wish to know what proportion or quantity of oil should be mixed with petrol, per gallon, taking into account a medium proportion of hill work. Please let me know the correct method to adopt in applying for a petrol permit.—F.W.E.

The correct proportion of oil to petrol is half a pint of oil to one gallon of petrol. Mention fully the circumstances of your case—that is to say, why you are applying for a petrol permit—and ask for a form to be sent to you. If the Petrol Controller's Department (19, Berkeley Street, London, W.1.) will see its way to grant you a permit, you simply have to fill up the form and pay the petrol tax in advance.

Engine will not Run Slowly.

I am the owner of a 3½ h.p. James twin fitted with a patent lubricator. This lubricator has never worked correctly since I received the machine in June of last year. The drops do not drip continually, but only drop slowly now and then, so I have had to resort to the pump. Sometimes when I use the pump a good deal of oil will collect in the bowl of the sight feed, and air bubbles will be seen forcing their way through from the crank case. Can you tell me how to cure these troubles? I have cleaned out the ball valve at the crank case. Do you think the spring of this is too strong? The engine has never run slowly enough (Amac, 23 jet). I have eliminated any air leakage there may be. The engine starts easily enough, so I presume that air leaks are not the cause of the trouble. I have tried a 25 jet, but this does not help much. I thought of fitting a by-pass, and think of making one myself. Would an ordinary jet led from the float chamber to the inlet pipe be sufficient? A friend states that I should require an arrangement to cut out the by-pass while the engine was running at the usual road pace. Is this so? Do you think the timing of the ignition has anything to do with the slow running? —V.P.

Possibly the trouble is due to your using too thick an oil. The symptoms described seem to imply that the spring in the ball valve is not quite strong enough. The fact that the engine does not run slowly is probably due entirely to the carburetter setting, and we can only suggest that you try some other jets and adapters. The fitting of a by-pass would be somewhat difficult. It usually consists of a rather small jet in a narrow orifice, so that a very small quantity of strong mixture is drawn up while the engine is running slowly. As the speed increases the throttle should be arranged so that the throttle, when raised cuts off the by-pass and allows the ordinary jet to come into operation. This would be rather difficult to arrange with your particular type of carburetter, but we daresay it could be done. We should not think that the timing of the engine is affecting the matter at all, although, of course, it would be quite capable of preventing slow running if it were wrong.

Magneto Lubrication.

I should be greatly obliged if you would kindly let me know: (1.) How to lubricate a U.H. magneto. I have one, and there are no oil holes. (2.) Is oil mixed with petrol a satisfactory lubricant for a two-stroke motor cycle? (3.) Which is the best method of lubrication for two-stroke motor cycle: oil mixed with petrol, pump feed or drip feed?—W.K.

(1.) The ball bearings in the magneto in question are packed with grease, and consequently do not need lubrication for an almost indefinite time. (2.) From the lubrication point of view the system is fairly satisfactory, but from the point of view of cleanliness it is very much the reverse, being exceptionally messy (see the notes on the subject in the article on lightweights in the issue of *The Motor Cycle* of March 7th, page 235). (3.) We should say that pump feed or drip feed would be the more satisfactory on the whole.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

THE NEED FOR ECONOMY.

Owing to the present drastic restrictions on the import of paper, the most rigid economy is necessary, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week, thus avoiding chance buying, which may lead to wastage owing to copies being left unsold.

Engine will not Start when Warm.

(1.) I have a Sun-Villiers two-stroke, which will start from cold with a pull of the back wheel after priming and flooding the carburetter (Amac, 27 jet), but when hot or only just warm I cannot start it at all, but have to wait until it gets cold again. (2.) Should there be an asbestos washer between the cylinder and release valve where it screws in? If so, would the absence of this cause the above trouble? (3.) When I open the throttle to its fullest extent, violent backfires occur, which stop the engine unless I half-close the throttle, after which it runs beautifully. (4.) Will you please tell me the correct mixture of oil and petrol under the petroil system? (5.) How should the ignition be timed? —A.B.

(1.) The symptoms which you describe are somewhat difficult to explain. It is just possible that the trouble is due to condensation on the plug points, or to the size of the jet not being correct; consequently there is too strong a mixture at starting when the engine is warm. You might, therefore, try a smaller jet. (2.) Probably there should be, the idea being to keep the release valve compression tight, but if there were a leakage here we do not think it would affect the engine starting only when warm. (3.) This also seems to indicate that the jet is too large. (4.) The correct mixture is half a pint of oil to one gallon of petrol. (5.) Time the engine in the following manner: Variable spark—Place the piston exactly on top of the compression stroke, and connect up the magneto with the points just broken and the ignition lever fully retarded.

Altering the Balance Weights.

My two-stroke engine has a solid crankshaft with two loose plates bolted on each cheek; these plates weigh 2 oz. each, and, there being only $\frac{1}{16}$in. clearance between crankshaft and crank case, the bolt heads are no thicker than a penny. These plates have often worked loose, and once jammed the connecting rod. They appear to me to be a nuisance. A friend suggests removing them, and, if it has much effect on the balance, to remedy it by putting a weight on to the flywheel, which is very heavy, and has two small holes doing nothing on to which I could bolt such a weight. But what effect would it have? Could it hurt the engine if I tried it? The engine seems free enough without these plates, but I have not tried it under power.—T.S.

If you remove the plates in question you will upset the balance of the engine, as they are evidently balance weights. It ought to be possible to secure them so that they do not come loose. You might try rivets instead of bolts. The holes in question in the flywheels are also for reasons of balance, and if you alter the position of your balance weights and fill up holes which have meant the removal of superfluous weight, you will upset the engine balance altogether.

RECOMMENDED ROUTES.

Middlesbrough to Blackpool.—S.G.

Middlesbrough, Stockton, Yarm, Thirsk, Ripon, Ripley, Skipton, Gisburn, Clitheroe, Mellor Brook, Preston, Lytham, Blackpool.

Thirsk to Great Grimsby.—M.E.

Thirsk, Easingwold, York, Market Weighton, Beverley, Hull Ferry, cross Humber to New Holland, Ulceby, Great Grimsby.

Tenby to Manchester.—W.T.

Tenby, Cardigan, Aberystwyth, Llanidloes, Newtown, Welshpool, Oswestry, Wrexham, Chester, Northwich, Manchester. Approximately 150 miles.

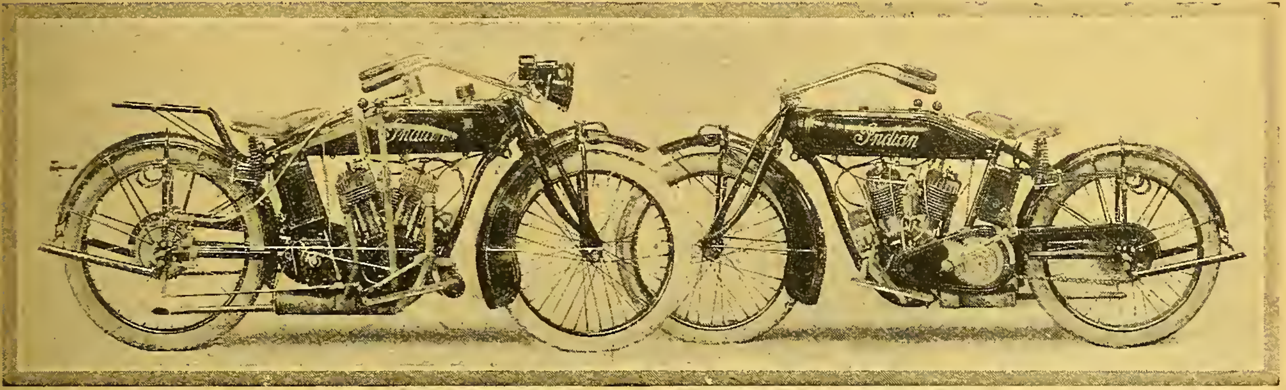
Brecon to Oxford.—H.F.

Brecon, Hereford, Ledbury, Tewkesbury, Stow-on-the-Wold, Chipping Norton, Woodstock, Oxford.

Tenby to London.—P.L.

Tenby, Carmarthen, Llandilo, Llandovery, Brecon, Abergavenny, Monmouth, Ross, Gloucester, Cheltenham, Andoversford, Northleach, Witney, Oxford, High Wycombe, Beaconsfield, Uxbridge, London. Approximately 250 miles.

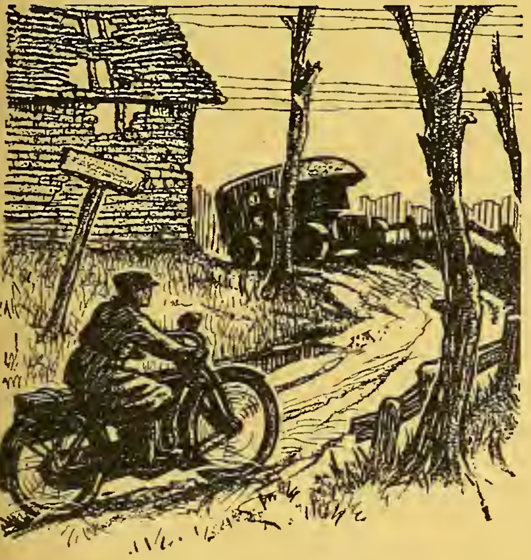
1918 Powerplus Indian Motocycles



Which we trust will be Post-War Models.

We regret that we are not in a position to supply motorcycles at the present time, but we can send 1918 abridged descriptive lists on application. This applies to Great Britain only.

HENDEE MANUFACTURING CO,
"Indian House," 366-368, Euston Road, London, N.W
Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA, 109-113, Russell St., Melbourne
CANADIAN WORKS, 12-14, Mercer St., Toronto
AFRICA, Indian House, 127-9, Commissioner Street, Johannesburg.
Indian House, 579, West Street, Durban
Indian House, Strand Street, Port Elizabeth.



Write for free Booklet, "Testimony," which gives you the opinions of users of Beldam Tyres. They know!

NO matter how rough the road—no matter what the condition of its surface, you can feel assured of the utmost tyre satisfaction if your Motor Cycle is shod with

Beldam

All - British Tyres

The Beldam V Steel Studded Motor Cycle Tyre is an all-roads-all-weathers tyre. Its rubber tread and steel studs are one level surface (studs are indented), and therefore it "toils not" in mud "neither does it spin" on hard roads. So much for grip. As to wear:—Rubber is thickest where wear is greatest; the side projections support this thick strip of rubber and they also allow lateral displacement. This accounts for the fact that Beldam Tyres do not easily get cut or punctured. Any user of Beldam Tyres will confirm this

The Beldam Tyre Co., Ltd., Brentford, Middlesex.

Manchester: W. Briggs & Co., Bazaar St., Pendleton. Nottingham: The City Rubber Co., 106, Upper Parliament St. Ireland: Vickery's Bantry Motor Garage Co., Bantry; The Simms Boyd Co., 7, College St., Belfast; P. Drohan & Sons, Castle St., Carrick-on-Suir. Egypt: Valsamidis and Valsamis, 3, Rue Stamboul, Alexandria. New Zealand: J. E. Fitzgerald, 139, Lambton Quay, Wellington.

Godbolds

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns —First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

Abingdon.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1914 T.T. 4h.p. Abingdon King Dick, fast engine; 25 gns. [4400

A.J.S.

A.J.S., 1915, 6h.p., quick detachable wheels, fine sidecar; 68 gns.—Farrar.

A.J.S. 1915 6h.p. Combination, spare wheel, Lucas lamp set, very fine combination; 78 gns.—Farrar.

A.J.S. 1916 6h.p. Combination, spare wheel, electric lights, 1,300 miles only; 84 gns.—Farrar's Motors, Hopwood Lane, Halifax. [4337

1915 A.J.S. Combination, 4h.p., 3-speed, kick start, with all accessories, nearly new.—Pickering, Shrewsbury. [X3051

A.J.S., 2¾h.p., 2-speed, splendid condition, only done 600 miles; £47.—Garratt, 31, Victoria Rd., Market Drayton. [4300

A.J.S. 6h.p. Combination, 3-speed; £77/10; property of an officer left on sale.—Wauchope's, 9, Shoe Lane, London. [4362

A.J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

A.J.S., 6h.p., latest Service Models, detachable wheels, 700×80 tyres; £91/6; immediate delivery.—Pepper's Garage, Shelton, Stoke-on-Trent. [X3037

ELCE & Co

CASH-EXCHANGE-EXTENDED TERMS

NEW MACHINES IN STOCK.

1918 **A.J.S.** Combination de Luxe (finished black), 6 h.p., screen, storm apron, spare wheel, 700×80 tyres **£120 0**
1918 **MATCHLESS** Combination, 8 h.p., M.A.G., spare wheel **£125 0**
1918 **ROVER** Combination, W.O. Model, 5-6 h.p. **£124 5**

SECOND-HAND COMBINATIONS.

1918 W.O. **MATCHLESS** Combination, 7-9 h.p., spare wheel, electric lamps, mud-shields, only ridden a few miles. **£120 0**
1917 **HARLEY-DAVIDSON** Combination, 7-9 h.p., magneto model, lamps, horn, nearly new **£115 0**
1916 **SUNBEAM** Combination, 8 h.p., M.A.G., lamps, horn, screen, interchangeable wheels, splendid condition **£105 0**
1916 **ENFIELD** Combination, 6 h.p., lamps, horn, hood, screen, speedometer, unscratched condition **£85 0**
1916 **NORTON** Big 4 and Sporting Sidecar, lamps, horn **£75 0**
1916 **B.S.A.** and Millford Sidecar, 4¼ h.p., chain-cum-belt, lamps, horn **£65 0**
1915 **B.S.A.** and Sidecar, all-chain drive, Lucas dynamo lighting and horn, splendid outfit **£65 0**

SOLO MACHINES.

1916 T.T. **NORTON**, 3½ h.p., lamps, horn **£45 0**
1917 T.T. **ROVER**, Philipson pulley, lamps, horn, as new **£45 0**
1917 **NEW IMPERIAL-J.A.P.**, 2¼ h.p., 2-speed, T.T. bars **£30 0**

15-16, Bishopsgate Avenue, —Camomile Street, E.C.3.—

'Grams: "Elcemocyca, London."
'Phone: Avenue 5548.

CAN WE ASSIST YOU?

Knowing the extreme difficulties at present prevailing as regards the shortage of parts, etc., we have acquired the following **Parts**, and beg to offer same to Motor Cyclists at exceptionally low terms. The goods mentioned are offered on the money back if not satisfied principle, cash with order, and subject to being unsold. Those requiring reply, please enclose stamp. When ordering, postage must be included. Excess, if any, will be refunded.

1 pair 1915 Scott Forks, complete, **£2.** Chain Links, ⅝in. × ¼in., half link, **8d.**; spring link, **6d.** 1in. Forward Belt Fasteners, **1/3** each. Bowden Cable Clips, 3 at **1d.** C. & A. Washers, for most engines, **2d.** each. Compression Tap C. & A. Washers, **1d.** each. Bowden Cable, carb. and brake sizes, **6d.** yard. Low-tension Wire, **6d.** yard. H.T. Wire, **1/-** yard. Lamp Tubing, **1/-** yard. Mudguard Bridges, **4d.** each. Stays, **6d.** each. B.S.A. T.T. Pulley, adjustable, 6in. drilled, **10/-.** 28×3 tyres, very heavy, at half makers' prices. Tubes, 26×2, **6/-**; 2¼, **7/-**; 2½, **8/6.** Motor Cycle Front Hubs, ⅜in. spindle, **4/-** each. A few Car Hubs, No. 1, in pairs, at **14/-** pair. Rims, 28×1⅜, beaded edge; 28×3 ditto; 650×65 ditto; requirements quoted for. Steel tubing, 1 1/16in., 1⅛in., 1¼in.; all gauges. Double Waterproof Khaki Twill, 60in. wide, new, but slightly soiled, **5/-** yard. Phosphor bronze, chilled bush metal, **2/-** lb. Files, assorted, brand new, 6in. to 12in., **7/6** doz. Gas Trailer and Bag, 6ft. × 3ft., slightly used, **£12.** 9 Gas Trailers, less bag, complete with tyres, **£5 10s.** each; suitable for carrying goods or gas. A few up-to-date Sidecar Bodies. 7ft. 4in. Lyso Belting, 1in., **6/6**; 7ft. 6in. ¾-belting, **8/6.**—Apply **Finished Stores, Henderson Sidecars, Aero Works, Fitzwilliam St., Sheffield.**

Photography and FOCUS

Every Wednesday Twopence.

DEFENCE OF THE REALM ACT

Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S., 1913-14, 6h.p., 3-speed, Gloria sidecar, Di lops, speedometer, spares, all accessories, first-cl condition; 55 gns.—11, Golds Hill Gardens, Handswor Birmingham. [X32

RIDER TROWARD and Co., 31, 40b, and 78, Hi St., Hampstead.—1915 A.J.S. 2¾h.p. lightweig 42 gns.; 1916 A.J.S. De Luxe combination, spare whe hood, screen, 95 gns. [43

A.J.S. 1916 Combination, splendid outfit, all acc sories, spare wheel, hood, screen, etc., £97/1 2¾h.p., 2-speed, £34; E.P. or exchange.—Service (292, High Holborn, London. [X32

A.J.S. 1916 6h.p. Combination, De Luxe side screen, storm apron, Lucas accessories, Cowey t hardly scratched; cost new £124 in February, 1916; under 4,000 miles; price £100.—Box L5,878, c/o *Motor Cycle.* [42

A.J.S. Motor Cycles.—Immediate delivery of Milit model, complete, detachable wheels, 700×80 ty £91/6; trade supplied; no permits required.—P. Evans, sole agent for Birmingham and district, 87 John Bright St., Birmingham. [4

1916 4h.p. A.J.S., No. 8,070, complete with lamp sets, mechanical horn, Cowey speedome pump, set of tools, including spare wheel, but no s car, approximate mileage 3,000, in perfect conditi £75.—Robinson's Garage, Green St., Cambridge. [4

A.J.S., 6h.p., and sidecar, with wind screen, lamp, horn; this is one of the latest 1915 models tur out, as it left the works in October, 1915. The ou has been thoroughly overhauled and revarnished, is practically equal to new in every possible respe price only £75.—Julian, 84, Broad St., Read Biggest light car and motor cycle dealer in the So 'Phone: 1024. Closed Wednesdays 1 o'clock. [0

A.J.S Spares; prompt delivery. — Cyril Willia Chapel Ash Depot, Wolverhampton. [9

Alldays.

ALLON, new 2¾h.p., 2-speed; £46/10.—Picker Mardol, Shrewsbury. [X3

ALLON, 1916, 2¾h.p., 2-speed, under 2,000 m new tyre and belt; no reasonable offer refuse Harvey, King St., Truro. [X3

ALLDAYS Allon, 2¾h.p., almost new, 1917, 2-sp and hand clutch, electric light, extras.—Li Muckart, New Military Hospital, Cannock Chase, St [4

ALLON, 2¾h.p., single, £38, new; 2-speed, £45, n 2-speed and hand clutch, £48, new; 2-sp £28/10; E.P., or exchange.—Service Co., 292, H Holborn, London. [X3

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3-s countershaft models in stock. [1

Arno.

ARNO 3½h.p., single speed, lamps, splendid condit £17/10, or nearest offer.—Lethermans Croft,] mow, Essex. [4

Auto-Wheels.

WALL Auto-Wheel, little used, perfect running or £6.—10, Norwood Crescent, Southport. [X

AUTO-WHEEL, good running condition; £6 Sandys, 9, Thomson St., Partick, Glasgow. [X

GENUINE Wall Auto-Wheel, complete, little splendid condition; £8/10.—Murray's, 37a, Ch St., Hatton Garden, Holborn. [X

MOTOR CYCLES FOR SALE.

Bown.

IDER TROWARD and Co.—1917 Bowns 2-stroke, Dalm engine, mileage 500, as new, 19 gns.—31, , and 78, High St., Hampstead. [4386

Bradbury.

IDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 Bradbury, 4h.p., 2-speed, ch, good condition; 19 gns. [4384

.p. Bradbury, vertical engine, rebuilt low frame, nice machine, new guinea lamp set; first £5.—ker, 10, Norwood Crescent, Southport. [X3238

15 Bradbury, 6h.p., and sidecar, all chain drive, kick start, free engine, gate, chain, sidecar only t months old; would sell 58 gns., or exchange.—53, ffield Rd., Wandsworth, S.W. [4265

Brown.

ROWN 2¾h.p., Bosch, B. and B., wants attention; £12, or nearest offer.—L. Senior, South Hiendley, nsley, Yorks. [X3243

B.S.A.

.S.A., brond new models H. and K. in stock; no permits required.—Moss, Wem. [X3248

3h.p. B.S.A.-Minerva, U.H. mag., B. and B., perfect; £8.—198, Town Rd., Edmonton. [4269

.S.A., 1913, 3½h.p., free engine; offer wanted.—N. Lee, 11, Bancroft Rd., Mile End, London, E. [4002

.S.A., I.O.M. model, 3-speed; £37/10; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3229

.S.A., 1915, chain driven, B.S.A. sidecar, equal to new; £55, with all accessories; seen any time.—3., 207, Shirland Rd., W.9. [4293

¼h.p. B.S.A. Combination, countershaft 3-speed gear, smart turnout; £65; property of an officer; also olo, 1915, countershaft, 4¼h.p. B.S.A., price 50 gns. auchope's, 9, Shoe Lane, London. [4363

IDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 B.S.A., 3½h.p., 2-speed, ch, pedal start, 24 gns.; 1913 B.S.A., countershaft in drive 2-speed combination, 32 gns. [4385

16 4¼h.p. B.S.A. Motor Cycle, 3 speeds, countershaft, kick starter, guaranteed sound, and in fect order, splendid condition; £40; first secures, gain.—Box 1,818, c/o *The Motor Cycle.* [X3255

16 B.S.A. Combination, 4¼h.p., chain drive, 3-speed, kick start, complete with all accessories, arrangements for running on paraffin, nearly new dition.—Pickering, Mardol, Shrewsbury. [X3050

.S.A., 1917, 4¼h.p., countershaft chain drive (Model H.), run about 800 miles, carefully used, condition new, fitted Lucas head light, horn, mirror, Jones dometer, C.B. sidecar given in; genuine bargain, , complete.—Reid, 18, Western Rd., Haywards Heath, sex. [4270

Calthorpe.

ALTHORPE, new, 2¾h.p., 2-stroke, 2-speed; £36/10.—Pickering, Mardol, Shrewsbury. [X3046

ALTHORPE-J.A.P., 2¾h.p., new models, £39/18; new single-speed model, £32; also a second-hand thorpe, £15.—Wanchope's, 9, Shoe Lane, London. [4364

ALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits uired.—P. J. Evans, 91, John Bright St., Birmingn. [4309

IDER TROWARD and Co.—Calthorpe, 2-stroke, 1915, 2-speed, 22 gns.; 1916, 2-speed, 26 gns.; thorpe-Jap, 1915, 2-speed, clutch, 24 gns.—31, 40b, 78, High St., Hampstead. [4387

Clyno.

LYNO Combination, minus single-ended rod and piston; sacrifice £20.—Wright, Fern Villas, Ful-d, Sutton-in-Ashfield, Notts. [X3235

LYNO 1914-15 Combination, 6h.p., 3 speeds, kick starter, and free engine, detachable wheels, spare el and tyre, hood and screen, beautifully sprung de e sidecar, all accessories; £65, guaranteed.—Waupe's, 9, Shoe Lane, London. [4365

LYNO, 6h.p., latest 1917, complete combination, renovated throughout, indistinguishable from new, accessories, special engine, undoubtedly fastest Clyno ainable, dynamo lighting if desired; what offers? Crole-Rees, Clyno Eng. Co., Wolverhampton, or Highbury Quadrant, London, N.5. [4282

Crescent.

½h.p. Crescent, 2-stroke, 2-speed, late 1917, tyres unpunctured, P. and H. head lamp, pretty mane, mechanically perfect; £28.—Apply, A. E. Upton, , Liverpool Rd., Irlam, near Manchester. [X3085

Dalm.

IDER TROWARD and Co.—Dalm 2-stroke, 1917, as new; 19 gns.—31, 40b, and 78, High St., mpstead. [4389

Diamond.

IDER TROWARD and Co.—Diamond, 1915, 3h.p., 2-speed, excellent order; 29 gns.—31, 40b, and High St., Hampstead. [4390

Dot.

IDER TROWARD and Co.—Dot-Jap 1913 6h.p. 2-speed combination, very fast; 35 gns.—31, 40b, d 78, High St., Hampstead. [4391

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ROBBIALAC

MOTOR CYCLES FOR SALE.

Douglas.

1915 Douglas, 3-speed, complete, tip-top; nearest offer over £40.—27, High St., Doncaster. [4306

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

DOUGLAS U., 2¾h.p., left works February. 1917.—Edgar Cove, Yacht Builder, Salcombe. [X3055

DOUGLAS, 1912-3, 2 speeds, free engine, perfect; 20 gns.—Lieut. Jackson, c/o 77, Acre Lane, S.W.2. [4279

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50. [5855

DOUGLAS, 1916, 2¾h.p., W.D., nearly new, Amac, Lucas lighting; £40.—Bailey, Market Hotel, Sutton-in-Ashfield, Notts. [X3045

DOUGLAS, 2¾h.p. (1914), kick starter, new Binks carburetter, splendid condition; £32/10.—Kitchin, 8, North View, Wimbledon. [4335

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

DOUGLAS, 1913, 2-speed, Bosch mag., £32/10; Model V, practically new, issued late 1917, £55; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X3212

4h.p. 1915 2-speed Douglas, semi T.T. bars, excellent machine, in good sound condition throughout; bargain at £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [4359

DOUGLAS, 1912, 2-speed, kick starter, splendid condition, tyres as new, lamp, mirror, suit of overalls, spares; £28.—Teall, 15, Waterloo Rd., South Yardley, Birmingham. [4312

1914 Douglas, 2¾h.p. Model U, 2 speeds, large Lucas lamp sets, Lucas guinea horn, in perfect order, and running like new; £33.—Wallis, 51, De Freville Av., Cambridge. [X3039

RIDER TROWARD and Co.—Douglas, 1914, 2-speed, clutch, kick start, 34 gns.; 1914 T.T., 2-speed, 34 gns.; 1913 T.T., 2-speed, 27 gns.; 1913 single-speed countershaft, 21 gns.; 1912, 2-speed, 19 gns.; 1912, single speed, 17 gns.; 1911 single speed, 14 gns.; Douglas spares in stock, including gear boxes and engines. [4388

LATEST 2¾h.p. W. Douglas, brand new, with the new pattern hand-controlled clutch, the latest front forks, and many other improvements, £54, plus 20%; also U. and V. models, 1916 specification, £50, plus 10%; absolutely new; immediate delivery against priority permits for doctors, farmers, war and munitions workers.—How and where to apply, full particulars, write Douglas Specialists, Robinson's Garage, Green St., Cambridge. [4352

Enfield.

ENFIELD 1915-1916 6h.p. Combination, good tyres, fine puller; 70 gns.—Farrar's Motors, Hopwood Lane, Halifax. [4338

ROYAL Enfield, 1917, 3h.p. twin, 2-speed, kick starter, splendid condition throughout; great bargain, 38 gns.—16, Edgar St., Sheffield. [X3083

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

1915 3h.p. Twin Royal Enfield, 2-speed, new heavy Dunlop and Palmer, perfect condition; £28/10, absolute bargain.—185, Brighton Rd., South Croydon. [X3041

RIDER TROWARD and Co.—Enfield, 1915, 3h.p., 2-speed, clutch, kick start, 33 gns.; 1916 Enfield standard combination, 73 gns.—31, 40b, and 78, High St., Hampstead. [4392

ROYAL Enfield 1917 6h.p. Combination, splendid condition, all accessories; will entertain exchange of Ford, or good make of car, cash adjustment.—Ireland, Sankey, Warrington. [X3175

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X3216

ENFIELD 3h.p. Twin, 2-speed, 1916 model, with speedometer and Lucas lamps, carefully used by R.F.C. officer, in excellent running order; cost £60, price £40.—Box L5,679, c/o *The Motor Cycle.* [4289

6h.p. 1917 Royal Enfield Combination, hood, screen, all the best accessories and speedometer, thoroughly overlooked by makers, and not used since; £97/10, guaranteed.—Seen at Wauchope's, 9, Shoe Lane, London. [4360

Excelsior.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1917 American Excelsior, dynamo lighting combination, hood, screen, run 50 miles, 93 gns.; 1915 American Excelsior, mag. model, sporting torpedo-shaped coachbuilt sidecar, 65 gns.; both are 7-9h.p., 3-speed countershaft, all chain drive, clutch and kick start. [4363

F.N.

F.N., 2½h.p., 2-speed, F.E., shaft drive, Bosch, good order; bargain, £15, or exchange and cash solo or 2-stroke.—13, Cornwall Mews, Gloucester Rd., S.W.7. [4329

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 F.N., 2½h.p., 2-speed, clutch, 17 gns.; 1913 F.N., 5-6h.p., 2-speed clutch, perfect, 32 gns.; latest model 7-9h.p. F.N., 3-speed gear box, hand clutch, kick start, coach sidecar, 69 gns. [4393

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Harley-Davidson.

1916 Harley Combination, electric model, in very good condition; £74.—40, Clonmere St., Southfields, S.W.18. [4330

HARLEY-DAVIDSON Combination, late 1915; £65, or exchange later model (electric).—54, Bounces Rd., Lower Edmonton, N.9. [4273

RIDER TROWARD and Co., 31, 40b, and 78, High St Hampstead.—1915 Harley-Davidson, dynamo lighting combination, 7-9h.p., 3-speed, 69 gns.; Harley parts stocked. [4394

FOR Sale, 7-9h.p. Harley-Davidson combination, 1916 model, bought Jan., 1917, cost £120, price £80; condition new, guaranteed perfect, not ridden 1,000 miles.—Baldwick, Pickle Manufacturers, St. Alban's Terrace, Sherwood St., Nottingham. [X3253

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X3214

Hobart.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1915 Hobart 2-stroke, 2-speed, clutch, 22 gns.; 1914 Hobart lady's lightweight, 3-speed, clutch, pedal start, 29 gns. [4396

HOBART 1914 6h.p. Combination, coachbuilt sidecar with screen, lamps, speedometer, new tyres, luggage carrier, everything complete; a bargain; in perfect order, £68/10.—Thompson, 13, Alexandra Av., Levenshulme, Manchester. [X3048

Humber.

HUMBER, 3½h.p., late 1914, 3-speed, kick start, Mills-Fulford sidecar, perfect condition; £47.—Dalton, Belper, Derbys. [X3199

HUMBER, 1914, 2¾h.p. twin, absolutely as new, and unscratched, large XI'all saddle; £16, worth double.—Reynolds, Waterbeach, Cambs. [4322

HUMBER, 3½h.p., 3-speed, new condition, with Montgomery sidecar; £45, or close offer.—Oliver, Sandlands, Walton-on-the-Hill, Surrey. [4268

2h.p. Humber Cycle, Bosch, B. and B. carburetter, Palmer tyres and tubes, excellent condition; £12, or exchange for gent's cycle and cash; evening after 6.—Shepherd, rear of 1, Swan Lane, Coventry. [X3266

1911 3½h.p. Humber, Bosch, B.B., N.S.U. variable, nearly new, whole thoroughly overhauled, lamps, horn, Cowey, spares, accessories, good tyres; £18.—Alken, 14, Cloudesley Rd., St. Leonards. [4299

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Immediate delivery of the new 3½h.p. fleet twin Humber, 3-speed, £75; also one soiled 1918 6h.p. water-cooled Humber, flat twin, 3-speed Cooper de Luxe 30 gn. sidecar, 95 gns. [4395

Indian.

5-6h.p. Indian, used two seasons only, about 191, carefully kept, powerful machine; £14.—80, Bispham Rd., Southport. [X3240

1915 Indian, 3-speed, 5h.p., mechanical horn, appearance and condition very good; £35.—Apply, The Hut, Ingatestone, Essex. [4262

INDIAN 1913 7-9h.p. 2-speed Combination, wicker, spring frame, hand clutch, good condition; £38.—Woodham, 418, Hertford Rd., Enfield Highway. [4259

INDIAN Motor Cycle, 7-9h.p., 1914, clutch model, splendid condition throughout, speedometer, horn, tools, little used; £25, or nearest; genuine bargain.—9, Algernon Place, Whitley Bay. [X3183

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead, have the following Indians in stock for immediate delivery: One 1916 Powerplus Indian, 8-10h.p., 3-speed, T.T. bars, 59 gns.; one 1915 7-9h.p. Indian, 3-speed, electric light, Phœnix coach sidecar, disc wheels, 59 gns.; one 1914 7-9h.p. Indian, 2-speed, coachbuilt combination, electric lighting, in fine mechanical order, 52 gns.; three 1915 T.T. 7-9h.p. Indians, clutch models, one with disc wheels, 37 gns. each; one 1915 T.T. 5h.p. 3-speed Indian, 39 gns.; two 1914 7-9h.p. Indians, spring frame, 2-speed clutch models, 36 gns. each; two 1914 7-9h.p. clutch model Indians, 29 gns. each; also most Indian parts. State requirements. [4398

Ivy.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1915 Ivy, 4¼h.p., 3-speed, clutch, kick start, coachbuilt sidecar, 37 gns. [4397

1916 Ivy and Sidecar, twin-cyl., 4-5h.p. J.A.P., 3-speed gear box, kick start, extra large mudguards, speedometer, lamp; 55 gns., or exchange.—24, Granard Rd., Wandsworth Common. [4284

James.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1916 James, 2-stroke, 2-speed; 27 gns. [4399

JAMES, all new models; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X3209

JAMES 1918 Model Handsome 5-6h.p. Combination, with 3-speed gear, kick starter, hand clutch, in stock; price only £104.—Pepper's Garage, Shelton, Stoke-on-Trent. [X3036

SPECIAL OFFER THIS WEEK.

Latest Model NEW IMPERIAL, absolutely new, engine never been started up. Maker's list price to-day £46 4s.

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A.J.S., NORTON, ROVER, LEVIS, ENFIELD, TRIUMPH, NEW IMPERIAL-J.A.P., INDIAN.

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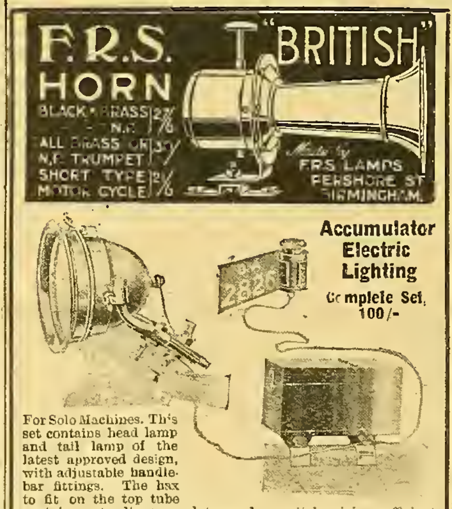

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Made by FRS LAMPS PERSHORE ST BIRMINGHAM

Accumulator Electric Lighting

Complete Set, 100/-

For Solo Machines. This set contains head lamp and tail lamp of the latest approved design, with adjustable handle-bar fittings. The box to fit on the top tube contains a 4-volt accumulator and a switch, giving sufficient light for the two lamps for approx. 10 hours at one charge. It, without doubt, fills a long-felt want for solo machine lighting.

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THE NORTH WALES MOTOR EXCHANGE,
Chester St., Wrexham, N. Wales.

MOTOR CYCLES FOR SALE.

James.

JAMES 3½h.p. Twin, 500 miles, 1916 (August), class condition, £15 of accessories; £45.— 12, Overcliffe, Gravesend. [X

JAMES, 3½h.p., 3-speed countershaft, kick st hand controlled clutch, fully equipped, in new dition; £40, or near, bargain. 'Phone: Park 86 Ayers, Lower Stables, Kensington Palace, W.8. [

JAMES 1914 Combination, 2-speed, hood, scree accessories, £17 paid last year replating, en ling, new hubs, chains, other replacements, looks new, in perfect running order; £40.—Davies, St. Pedmore Rd., Lye. [X

J.A.P.

5-6h.p. J.A.P., 1914, Bosch, Binks, 2-speed, and car, good tyres all round, and perfect; £2 near offer.—Burton, 61, Gelderd Rd., Leeds. [

1917 8h.p. J.A.P. Sunbeam Combination (War Model), No. 2 sidecar, wind screen, luggage storm apron, lamps, horn, spare wheel (unused), not done 1,000 miles; this is a lovely outfit, in exc condition; £115; trial by appointment; no eff Walker, 54, Linaker St., Southport. [X

J.E.S.

J.E.S. 1h.p. Motor Cycle, little used, complete; offers?—Clark Bros., Kilieshandra, Co. Cavan [X

Kerry.

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—1912 Kerry-Abingdon 2- clutch combination, 24 gns.; 1914 T.T. Kerry-A don, 24 gns. [

Lea-Francis.

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—1915 Lea-Francis, 3¼h.p. J.A.P., 2-speed, all chain, clutch, kick start; 48 g [

LEA-FRANCIS, twin J.A.P. engine, 2-speed, cou shaft, kick starter, footboards, oversized perfect running order, not used last two years; £ Lieut. Hunter Smith, c/o Merilees, Cedar Av., Ch ford. [

Levis.

LEVIS, new single and 2-speed models in stock permits required.—Moss, Wem. [X

LEVIS, 2-speed, £25; single, £19/10; E.P. or change.—Service Co., 292, High Holborn, Lo [X

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—1916 Levis, 2¼h.p. Popula fine condition; 21 gns., complete. [

Lincoln-Elk.

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—1913 Lincoln-Elk, 3½h.p., able gear, will take sidecar; 19 gns. [

Matchless.

MATCHLESS 8h.p. Combination, J.A.P. £75 M.A.G. engines £67/10; E.P. or exchanges.—vice Co., 292, High Holborn, London, W.C.1. [X

MATCHLESS Latest War Model Combination, plete with detachable wheels, spare wheel and £120.—Exeter Motor Cycle Co., Ltd., Bath Rd., E [

1914-15 Matchless Combination, 8h.p. M.A.G., h horn, luggage carrier, very nice order; £70.— and Co., 15-16, Bishopsgate Av., Camomile St., [

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—Matchless 1916 8h.p. M coachbuilt combination, 69 gns.; Matchless 1915 J.A.P. coachbuilt combination, 59 gns.; both abov 3-speed, clutch, and kick start, all chain drive mo Matchless 1913 6h.p. 2-speed J.A.P. coachbuilt bination, 35 gns. [

MATCHLESS Latest War Model Combination, plete with spare wheel and tyre, with case, new Lucas lighting set, extra tool case, numerous s not done 100 miles, condition guaranteed indistin able from new; price 105 gns., bargain.—Captain son, Southwark Military Hospital, East Dulwich S.E. Tel.: 1216 New Cross.

Metro.

METRO, 1916½, 2-speed, 2-stroke, 2½h.p., 90 m done 1,700 only, Stewart speedometer, Luca largest Brooks saddle, 3 toolbags, spare tank, co with tools and spares; Wellingborough district; fice for special purpose £18; deposit.—Box 1,82 *The Motor Cycle.* [X

Minerva.

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—Minerva, 1910, 3½h.p., B. and B., running order; 9 gns.

Motosacoche.

RIDER TROWARD and Co., 31, 40b, and 78, St., Hampstead.—Motosacoche, nearly new, 3½h.p. twin M.A.G., De Lissa air-cooled exhaust Enfield gears, clutch, and kick start, 46 gns.; ditto, 32 gns.

New Hudson.

NEW Hudson Combination, 4¼h.p., 3-speed, fr gine, kick starter, new tyres and tubes, in did condition; £30, or near offer.—45, Bow Co Lane, E.3.

MOTOR CYCLES FOR SALE.

New Hudson.

14-15 3½h.p. New Hudson, basket sidecar, clutch, Bosch mag., extra new tyre, lamps, complete, ellent running order; £45.—Fordham, London House, keridge, Herts. [X3203

IDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1916 New Hudson, 2-stroke, 2-d, nice little machine, 25 gns.; 1915 New Hudson six coachbuilt combination, countershaft, chain-cum-drive, clutch, kick start, 52 gns.; 1914 New Hud-big six coachbuilt combination, 3-speed, 46 gns. [4410

New Imperial.

ROW Bros., Guildford.—New Imperial, latest 2½h.p., 3½h.p., 6h.p. models in stock; also sound second-ds [1047

EW Imperial-Jap, 8h.p., 3-speed War Model combination; 109 gns.; delivery from stock.—Exeter or Cycle Co., Ltd., Bath Rd., Exeter. [3521

EW Imperial-Jap, 1914 6h.p. twin, 3-speed, F.E., enclosed Bosch, Binks carburetter, good order; ain, £35; trial or exchange, cash either way.—13, wall Mews, Gloucester Rd., S.W.7. [4328

EW Imperial Motor Cycles, 2 speeds, clutch and kick starter, and lady's models in stock for im-iate delivery; trade supplied; no permits required. J Evans, 91, John Bright St., Birmingham. [4310

New Ryder.

DER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1916 New Ryder-Jap, 2-speed, as 26 gns. [4409

Norton.

RTON Big 4, all-chain drive Military Model; £82. —Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3524

DER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Immediate delivery of the new ary Model Norton, 4h.p., 3-speed, enclosed chain ; £82/10. [4408

17 4h.p. Norton, countershaft 3-speed model, latest chain drive transmission, 3-speed, h.b.c. clutch, starter; £67/10, accessories included.—Wauchope's, hoe Lane, London. [4361

RTON Big 4, 1914, and Watsonian coachbuilt side-car, just completely overhauled and rebushed, ney 3-speed gear sent to makers, tyres and belt in ct condition, new mudguards and carrier, many s, including tyre and belt, complete with tools, s, and mechanical horn; £40, or near offer.—Arthur, l Hotel, Grantham. [4291

N.S.U.

DER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 N.S.U. 3h.p. twin, 2-speed, , pedal start, good lightweight; 19 gns. [4411

VING Acquired the entire stock-in-trade of the N.S.U. Motor Co., Ltd., we can supply spares for cally all types of N.S.U. motor cycles. In ordering important to submit old parts as patterns.—Eagles Co., Acton Hill Works, Acton, W.3. [0739

O.K.

., 1916, 2½h.p. J.A.P., 2-speed, clutch, tyres 26× 2¼. Brooks saddle, new condition; £30, no offers. , 5, York Rd., Leamington. [X3246

P. and M.

nd M., 1914, not run 1,000 miles, condition as new.—Jagger Swift, Thurgoland, near Sheffield. [4314

Precision.

ER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1914 T.T. Precision, 4h.p., disc , 24 gns.; 1914 Precision, 4h.p., 2-speed, 25 gns.; 2-speed Precision, cane sidecar, 25 gns. [4413

Premier.

EMIER, 1914, 3½h.p., 3-speed, P. and H. lamp, horn, Stewart speedometer, etc., £23/10; 1916 ., 3-speed countershaft and kick starter, coach-sidecar, large P. and H. lamp, horn, £61/15; E.P change.—Service Co., 292, High Holborn, London. [X3220

ER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Premier. 1916 Military Model, ., 3-speed countershaft gear, clutch, kick start, .; 1915 Premier 3-speed countershaft coachbuilt nation, 45 gns.; 1914 Premier 3-speed coachbuilt nation, 39 gns.; 1913 Premier 3-speed combination, .; 1913 Premier, 2-speed, clutch, pedal start, new sidecar, 35 gns.; 1913 2-speed Premier, 25 gns.; T.T. Premier, disc wheels, 15 gns.; 1915 Premier model lightweight, as new, 27 gns. [4412

Quadrant.

ADRANT, 4h.p., and torpedo cane sidecar, in perfect order; £14/10, or cycle only £13; new tyres, and horn, very fast and powerful.—128, Cam-l Grove, S.E.5. [4297

Rex.

ER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 6h.p. Rex, with 1916 Rex , 36 gns.; 1913 6h.p. Rex, cane sidecar, 29 gns.; Rex, 8h.p. T.T., clutch, handle start, 29 gns.; 1912 Rex, 4h.p., Philipson, smart solo mount, 19 gns. [4416

Rover.

ER, new solo and combination models in stock.—Moss, Wem, [X3250

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ROVER, 1914, 3½h.p., 3-speed, and clutch, coach-built sidecar, in excellent condition; £38.—Coffee Farm, High Rd., Byfleet. [4263

ROVER.—All new models supplied; 3½h.p. 3-speed combination, £27/10; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3211

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Rover 1914 T.T., Philipson, 27 gns.; Rover, 1913, clutch model, 22 gns. (D) [4417

ROVER, 1915 T.T. model, 3½h.p., P.H. lamps, mechanical horn, etc., machine like new; bargain, £28.—King, Chemist, Sutton, Surrey. 'Phone: 646. [4275

ROVER Motor Cycles, 3½h.p. and 5-6h.p. models, in stock for immediate delivery, both solo and side-car outfits; trade supplied; no permits required.—I' J. Evans, 91, John Bright St., Birmingham. [4308

3½h.p. Rover 1917 New Combination, 3-speed counter-shaft gear, clutch, and kick starter; can be sold without permit; bargain, take 80 gns. cash, same costing now over £100; accessories included.—Seen at Wauchope's, 9, Shoe Lane, London. [4354

1917 Rover T.T., with Philipson pulley; this machine is absolutely indistinguishable from new, and has not been 5,000 miles; original price £67/10; to clear this machine we are offering it to the first person who sends cheque for 45 gns.; this is undoubtedly the cheapest machine in England to-day.—Julian, 84, Broad St., Reading. 'Phone: 1024. [0737

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ROYAL Ruby.—All new models supplied; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X3215

ROYAL Ruby, 3½h.p., Bosch, Grado, speedometer, new belt, tyres perfect; £17.—Harper, 228a, High St., West Bromwich. [X3043

ROYAL Ruby, 2¾h.p., just overhauled; genuine bar-gain; accessories; sacrifice 18 gns.—32, King Henry's Walk, Dalston, N. [4267

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Royal Ruby, 1915, 2-stroke, Villiers engine, entirely rebuilt; 19 gns. [4415

ROYAL Ruby, shop-soiled only, 1917 model, 4h.p. J.A.P. engine, kick start, hand clutch, Sturmey-Archer 3-speed countershaft gear, £60; catalogue price £72; will fit lighting set and horn.—Buntings, Masons Av., Harrow. [4378

Rudge.

1916 Rudge Multi, complete; £40.—27, High St., Doncaster. [4303

RUDGE, late 1913, oversize tyres, mechanically sound; £20.—53, Brixton Rd., S.W.9. [4296

1913-14 Rudge, free engine model, nice condition throughout; £22.—40, Clonmere St., Southfields, S.W.18. [4331

RUDGE, 1913, clutch, kick start, lamps, horn, etc., good condition throughout; £22.—Fox, 600, Fulham Rd., S.W.6. [4281

I.O.M. Rudge Multi, sloping frame, clutch starting, overlap cam, perfect; £45; nearest offer.—14, Church Rd., Moseley, Birmingham. [X3202

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1917 Rudge Multi, Service 3½ h.p. model, 48 gns., with underslung sidecar 56 gns.; 1915 Rudge, 5-6h.p., 3-speed, Rudge coach sidecar, 45 gns.; 1914 Rudge Multi, 3½h.p., underslung coach sidecar, 37 gns.; 1913 Rudge, variable gear, sporting sidecar, renovated throughout, 35 gns.; 1912 Rudge, 2-speed, clutch, 19 gns.; 1913 T.T. Rudge, 22 gns.; 1913 Rudge Multi, 27 gns.; 1911 Rudge, 17 gns.; Rudge parts stocked. State requirements. [4414

Scott.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 Scott, 2-speed, 29 gns.; Scott parts stocked; state requirements. [4418

1915 Standard Scott, with coachbuilt sidecar, splendid condition throughout, all spares and accessories.—Officer, c/o Woodford Wells Motor Works, Woodford, Essex. [X3088

T.T. Scott, 3¾h.p., 2-stroke, 2-speed, etc., just been overhauled and re-enamelled, new tyres back and front, Binks carburetter, Bosch mag., etc.; £38/10, or near offer; spare parts for engine, gears, etc., can be had.—G. B. Whitaker, Woodside, Ottershaw. [4315

Sheffield Minor.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1916 Sheffield Minor, 2-stroke, as new; 19 gns. [4419

Singer.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1914 T.T. Singer, 2½h.p., clutch model; 22 gns. [4420

Star.

1914 Star, 4¼h.p., Bosch mag., 3-speed countershaft gear, clutch, kick starter, head lamp, horn; must sell; sacrifice 29 gns.; close offers accepted.—Stiles, 68, Elmsleigh Rd., Wandsworth. [4264

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Sun.

SUN-VILLIERS, 2½h.p., 2-speed countershaft, new, £37/16; V.T.S., single speed, new, £30/10; 1916 2½h.p., 2-speed, £28/10; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3218

Sunbeam.

SUNBEAM 3½h.p. Combination, absolutely as new; £95; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3232

SUNBEAM, one new 3½h.p. 3-speed countershaft model actually in stock, latest W.D. finish; no permit required.—Moss, Wem. [X3251

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1916 Sunbeam, 3½h.p., 3-speed, 65 gns.; with Bramble lightweight coachbuilt sidecar, 75 gns. [4421

1914 6h.p. Sunbeam, 3-speed, free engine, kick starter, just been thoroughly overhauled, enamelled, and plated, speedometer, horn, lamp, and tyres new; bargain, £55.—45, Bow Common Lane, E.3. [4277

3½h.p. Sunbeam, War Office Model, double tank, grey finish, semi T.T. bars, 3-speed countershaft gear, h.b.c. clutch, and kick starter, includes all accessories, £77/10; also a 3½h.p. 1916 Sunbeam combination, £87/10, including all accessories, and guaranteed.—Wauchope's, 9, Shoe Lane, London. [4355

Swift.

SWIFT and C.B. Sidecar, 1915-16, 3½h.p., clutch, and K.S., complete with lamp and horn, splendid condition; £49/10; E.P., or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X3213

T.D.C.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1917 T.D.C. de Luxe 2-stroke, as new; 19 gns. [4422

Torpedo.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1913 Torpedo-Precision, 3½h.p., 2-speed, and sidecar; 25 gns. [4423

Triumph.

TRIUMPH, 1913, 4h.p., 3-speed, Mills-Fulford sidecar, new Dunlops; £37.—Dalton, Belper, Derbys. [X3200

1911 Triumph, new tyres and belt, lamp, horn, mirror, pump, few spares, running order; £15.—Waters, Walton, Norfolk. [X3177

TRIUMPH, 3½h.p., £17/10; 1912-3, Bosch mag., S.A. free-wheel clutch, £26/10; E.P. or exchange.—The Service Co., 292, High Holborn, W.C.1. [X3208

TRIUMPH, 1914, 4h.p., free engine, 3-speed, lamps, horn, new tyre, coachbuilt underslung sidecar to match, all good condition; purchased car.—Barry, Sutton Bassett, Market Harborough. [X3259

4h.p. 1915 Triumph, countershaft model, 3-speed, kick start, and free engine, includes all accessories, very fast, only used for solo riding, guaranteed mechanically sound; £57/10.—Wauchope's, 9, Shoe Lane, London. [4356

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Triumph, 1911 standard, 16 gns.; 1913 T.T., 22 gns.; 1913, 2-speed, clutch, 24 gns.; 1913 T.T., 3-speed, 29 gns.; 1914 4h.p., 3-speed, 34 gns.; sidecars to suit; Triumph parts stocked; state requirements. [4424

Vindec.

VINDEC 6h.p. Twin, 2 speeds, kick starter; 18 gns.; appointment.—Miss D. Minns, 133, Mayall Rd., S.E.24. [4347

Wolf.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Wolf, 1916, 2-stroke, 19 gns.; Wooler, 1915, 2-speed, 2-stroke, spring frame, 25 gns. [4425

Zenith.

ZENITH, 1915, 4h.p., w.c., Gradua gear, Jones speedometer and horn; £45; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3217

ZENITH, 1915½, 8h.p., countershaft, kick start, Farlow sidecar, hood, screen, speedometer, lamps, ready for road; £60.—Cox, 4, Donerail St., Fulham Palace Rd., London. [4332

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Zenith-Graduas in stock include 1916 TT. 4-5h.p. twin, 56 gns.; 1914 6h.p., clutch and kick start, Canoelet sidecar, 46 gns.; solo, 38 gns.; 1913 6h.p. T.T., 31 gns.; 1914 4h.p., 29 gns.; 1913 4h.p. 26 gns.; 1912 4h.p., 22 gns.; also one special 1914 4h.p. Precision-engined Zenith-Gradua, 29 gns. [4426

Ladies' Motor Cycles.

2¾h.p. Lady's Douglas, kick start, 2-speed gear, accessories included; £35, guaranteed.—Wauchope's, 9, Shoe Lane, London. [4357

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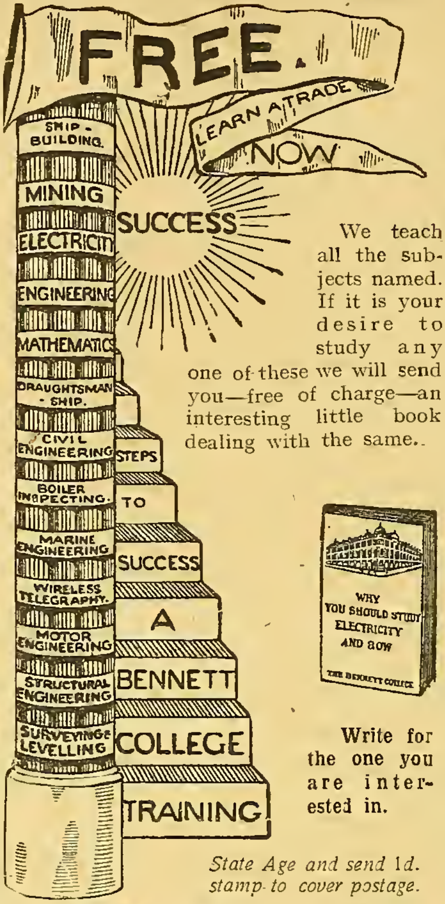
WE Have Several good class lightweights and higher power machines and combinations for sale at bargain prices or deferred payments; enquiries invited.—Buntings, Masons Av., Harrow. [4377

WEST Norwood Motor Clearing House have a late model Scott combination, with low sporting sidecar, to clear; no reasonable offer refused. Please call.—W.N.M.C.H., 6c, Lansdowne Hill, West Norwood. [4349



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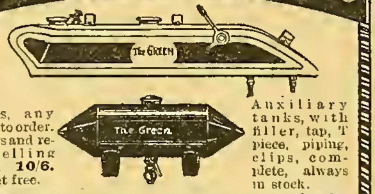

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JAMES, 1917, 2¼h.p., 2-stroke, 2 speeds, lamps horn; £40.—See below.

JAMES 1915 4¼h.p. Combination, 3 speeds, clu and kick starter, all-chain drive; £60.—See be

ROYAL Enfield, 1916, 2¼h.p., 2-stroke, 2 spe lamps, and horns; £38.—See below.

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ROYAL Enfield Combination, 1916, 6h.p., la horn, and speedometer; £78.—See below.

ROYAL Enfield Combination, 1917, 6h.p., with v screen, Lucas lamps, Stewart horn; £90.—See be

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A New Departure.

FOR introducing an aviation section to *The Motor Cycle* we need offer no apology to our readers; in fact, the interest displayed by motor cyclists in air-motoring since the new feature—Flying Facts and Theories—was started in this journal fully justifies such a policy. It is an indisputable fact that motor cyclists make the best pilots, and nearly all pilots are therefore motor cyclists. Flying, therefore, may be said to come almost within the sphere of this journal.

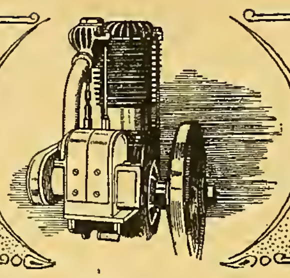
The need for dealing with flying in non-technical language is clear, and, judging from the number of our readers who desire to join the flying services, it is evident that we should be in a position to give them all the information possible, and so continue to help the country in the same successful manner as when this journal recruited over 10,000 readers into the R.E. Signal Service, the M.M.G.S., and the Tanks. Notwithstanding the introduction of this feature, the motor cycle in its several forms will in no way be neglected; there will be no dearth of motor cycle news, and the subject will be treated to the same extent as before, but with this difference, that *The Motor Cycle* proper will not contain articles on flying, but will deal mainly with that vehicle, the development of which it has so successfully fostered without ceasing through times good or difficult for the past fifteen years.

Let us consider why the young motor cyclist is so enthusiastic about flying, and, when he has mastered the rudiments of aeronautical work, makes so good a pilot. The reasons are not far to seek. The youth who rides a motor bicycle is generally in fine condition—motor cycle riding brings this about—he drives a self-propelled vehicle which has not only to be ridden but also driven; he subconsciously balances the machine, and, at the same time, uses his brain to control and get the best out of a beautifully made little engine. Not only is the body but also the mind kept fit, the nerves are braced and steadied, and the rider eventually possesses the much-desired *mens sana in corpore sano*. Hence the trained motor cyclist—fearless, skilled, and a good amateur mechanic—is well supplied with useful knowledge before he has learnt a single lesson in flying or listened to a single lecture on aeroplane engines.

The desire to fly is present probably in the mind of every motor cyclist. How often has the feeling come over the rider, seated on a fast, smooth-running machine, hurtling along at a good pace on a straight and undulating road, when hills are annihilated, that, while shooting up some stiff gradient, it would be joy indeed to continue one's course and sail into the clear air, leaving the road and its bumps behind, and soaring forward straight across country until one's destination is reached? Many, also, have dreamt of a motor cycle with folding wings, which could be mechanically extended as one travelled along, and would enable the machine to leave the ground and fly away into space. The artist who, some years ago, illustrated the idea in *The Motor Cycle* was not alone in his imaginations. In these days of flying progress it would be rash to prophesy that such a feat would not eventually become feasible, but we simply quote the idea, without pretending to any knowledge of the future, to show how the desire to fly is latent in practically every reader of this journal.

Our object, therefore, is by means of this section to help the embryo pilot in his education, to keep him up-to-date with regard to the Air Services, so that he may join either the Service or a Cadet Training Corps and eventually obtain a commission. Above all, we desire to deal with the subject in a simple and comprehensive manner, so that the merest novice may learn with ease. By thus treating aviation in all its forms we feel that we are serving the country, and if we ever so slightly assist the nation in its hour of need we are content.

Two-stroke Engines and Efficiency.



A Suggestion for Increasing the Efficiency of Two-stroke Engines, involving the Use of a "Displacer Piston."

THE present interest in and desire for more highly efficient engines on the part of the motor cycling public and at least some manufacturers, prompt me to the consideration or reconsideration of that most flagrantly inefficient engine—the popular two-stroke. The two-stroke has won its way to popularity, not because of its efficiency, but because of its simplicity and the consequent low first cost. Many people first take up motor cycling as an experiment, therefore they want something the first cost of which is low, and preferably something that is comparatively simple. But these one-time recruits now demand something better. Many of them still want the even torque of the two-stroke but are not eager for the complications of a four-stroke twin that would secure it to them. What most motor cyclists really want is a far more perfect and far more powerful single-cylinder two-stroke. For the inefficient two-stroke becomes even more inefficient with an increase in size, so that a powerful single-cylinder two-stroke is practically non-existent. As has been pointed out by many—if the two-stroke were only as volumetrically efficient as the four-stroke, then size for size it would be twice as powerful.

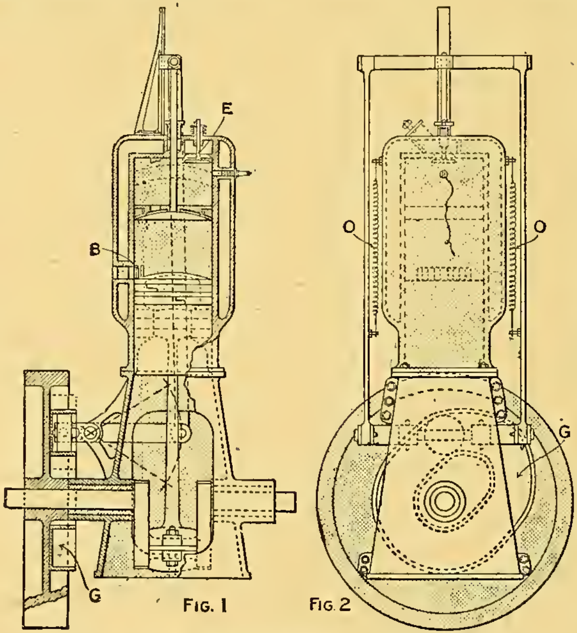


FIG. 1 FIG. 2

The two-stroke engine designed by the writer of the accompanying article. Fig. 1, a part sectional elevation of the complete engine; fig. 2, the special cam arrangement operating the displacer piston that secures complete scavenging and a fuller charge.

The problem, then, is how to make it at least equally efficient. Some manufacturers attempt to attain this end by some form of improved (and incidentally more complicated) or added valve gear. The full efficiency that is demanded can only be got by a thorough scavenging of the exhaust and introduction of a full charge after the scavenging. In present-day two-strokes it is doubtful if anything like a full charge is drawn into the crank case, because its capacity due to clearance for crank, etc., and the cup-like piston, make a strong vacuum impossible. For the same reason a strong crank case compression is not obtainable, and the resistance offered by the exhaust against the incoming charge, not to mention that part of the charge that finds its way out of the exhaust port, makes a thorough scavenging of the exhaust and a full uncontaminated charge a thing impossible.

Even in the early days, there was a design patented that in its purpose accomplished that which we are now seeking. A patent for this design was first taken out in 1902 (No. 10,700, Arthur Thomas Collier). In 1912—ten years later—not having heard of this, I also invented and patented a very similar design now made public for the first time. The final search of the Patents authorities brought this previous design to my notice, and owing to its similarity in the main essentials I dropped mine entirely.

No doubt these designs, or at any rate the first, was like a thing born before its time, and perhaps now forgotten even by the inventor himself; whether any engines on these lines were ever made I have been unable to discover. The design presents difficulties, but not, as I imagine, insurmountable ones. The drawings I submitted to the Patent Office are here reproduced, and it will be seen that the chief feature consists in the introduction of an additional piston termed the displacer piston. This light piston remains at rest against the top of the cylinder during the firing stroke until the usual exhaust port B is uncovered slightly, when it then descends, travelling at twice the speed of the main piston meeting this except for a clearance just as the exhaust port is once more nearly covered by the main piston (see fig. 1). This light displacer piston, owing to its greater speed, returns to its place of rest well before full compression is reached. In its downward motion it sweeps out the exhaust through the port B and simultaneously draws in a free charge behind it through the valve E. It will be noticed that this displacer piston has no heavy duties to perform, all the compression and firing being borne by the main piston as usual. It could, therefore, be very light in construction. As shown it is operated by a cam G on its downward journey, but returned by means of coil springs O, some clearance being allowed in the outer ring of the cam (see fig. 2). The height might make a special form of petrol tank necessary.

A. G. MACKAY.

OCCASIONAL COMMENTS.

By "IXION."

My Favourite Rough-rider Mount.

As a chronic rough-rider, I read with very special interest "Wharfedale's" criticisms of various machines employed by him in a bad winter's mudlarking. I do not profess to be a neat rough-rider: for example, I do not shift my pipe to between the two front dead centre teeth on grease, as Major Watson's famous crack used to do: I pay less attention to the pretty-pretties of driving in winter than in summer, and am generally content so long as I can keep upright and warm. My own favourite mudlarker was a T.T. Rudge. I do not like anything lighter for bad surfaces: the little 'uns bounce too much, and a big jolt that finishes up obliquely on a patch of grease is apt to cause a wild skid. Neither do I like anything heavier, for in long distance work the strain of holding up 3 cwt. or so is apt to tell on one's wrists. The earlier Rudges were just the right weight, and were beautifully balanced. Mine had a handle-bar which was wide enough to give plenty of leverage without splaying one's arms overmuch, low enough to throw a little extra weight on the front wheel without being so low that it could stab the tank if you went over. Unfortunately, for military work anywhere, and for winter roads in most peaceful areas, we need a gear box, which my pet Rudge did not possess: and I cannot say that I have ever found a mount of the go-anywhere order which struck me as ideal for the most exacting winter work. I always turned down the beautifully balanced Scott, for the simple reason that a machine is simply bound to tumble once or twice in a hard winter's work, and the Scott had a number of expensive low down fitments which were always crumpled when it spilt.

A Case in Point.

I remember watching the late Ivan Hart-Davies "shake" a well-known amateur on a Scott on a summer day when a little rain had fallen. "H.-D." was a very fine cross-country rider—much better than his companion, with whom he intended to have a little fun. He volunteered to lead the Scott rider over a certain short cut of about fifty miles, when the pair of them were returning to headquarters after a hill-climb. "H.-D." made the pace a cracker, and put in his best corner work. There was a thin film of damp on the road surfaces, and the Scott rider purled over some five or six times on the run. To quote a bomb-tester's report, "the fragmentation was good." The poor man-handled Scott wanted about £5 worth of new bits when it got home: and its rider's legs had hung without bottom support for the last ten miles, like the undercarriage of an aeroplane. For rough work, give me a 'bus with cheap and simple underworks, which can be kicked straight after a fall, and replaced for a shilling or two if necessary.

What about Tyres?

I suppose it is a point of honour with the genuine rough-rider to scrabble along on any old tyre. I plead guilty to a great weakness for Roms in fast winter work. Their rubber cross-bars give you a hold on hard frozen roads, and the steel studs bite well on grease. I am not partial to these combination covers in summer: naturally, they are not as long-lived as an all-rubber tread, and they are not ideal for smooth sun-baked roads. But it is astonishing with what safety they keep you vertical at speeds on atrocious surfaces in winter.

Spring Frames in Winter.

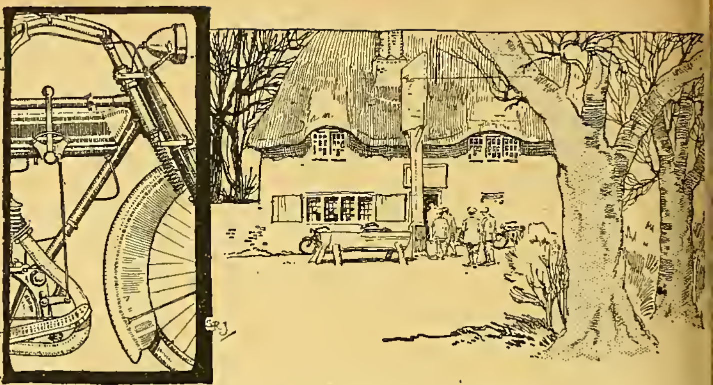
I doubt whether "Wharfedale" can have tried out a first-class spring frame in rough-riding conditions; if he has, he must have used it on truly impossible surfaces. He turns them down because they give no more comfort than the Scott, and bang your spine over big bumps. If a spring frame bangs your spine, what price a rigid frame? I can introduce our contributor to spring frames which are possibly dangerous from an opposite standpoint. They smooth out the road more than is safe when serious skids are prevalent. I mean just this. If I take out my pet spring frame in winter, I presently realise that I am riding too fast. I start the trip with a little wind up, being out of practice on grease. I slither along very comfortably for a few miles, realise there is no danger, and put the pace up. Presently, whilst holding the machine a little carelessly, I take a springbok leap over a big bump, and come down on a patch of bad grease—more or less sideways across a slight camber, with the front wheel not held firmly enough; and all at perhaps 35 m.p.h. I have to fight the machine like a tiger to keep upright, and I realise that the comfort of the spring frame has tricked me into riding somewhat too fast and the pace drops again to its former rate.

The Engine for Grease.

Nor do I agree that any particular type of engine is pre-eminently suitable for rough riding. On paper, of course, an engine which gives perfect torque and demands no gear changes is the thing. In actual practice there is not a radical difference between the torques of the single-cylinder, the two-stroke, the flat twin, and the V twin, and they all want a gear box astern of them. Such contrasts as exist between these four types of engine from a rough-rider's standpoint can all be levelled up by using a suitable gear ratio, combined with a good type of gear change. The single-cylinder four-stroke is obviously the worst, but if we gear a 3½ h.p. Rudge down to, say, 5½ h.p. on top, we can want nothing better. Earlier in the war, when I daily did a lot of vile rough riding, including moorland tracks with a grade of 1 in 4, I used to put my A.B.C. down to its 9½ gear, on which I could climb practically anything, and vary my speed from two to forty miles an hour without taking a hand off the steering bar. Alternatively, with an inflexible engine, it is essential that the gear controls shall be good. The rough rider cannot conveniently spare a hand for a tank gear lever, and at the same time perform delicate toe-twiddles on a clutch pedal when his mount is skidding and bouncing heavily.

THE DOUBLE-ACTING ENGINE.

Possibilities of a Design combining the Advantages of Conventional Two and Four Strokes.



THE problem of the two-stroke engine is a fascinating one, and for several years a large number of engineers have been under its spell. Probably the very simplicity of this type of engine has been responsible for its comparatively slow development, as in the simplest designs, such as the Levis, Connaught, and other machines of that ilk, there are only three moving parts, while the impulse effect is as with a two-cylinder engine of the four-stroke type. Designers have endeavoured, to obtain double the result for less than half the cost of a four-stroke engine. In the writer's opinion this appears to be asking too much, and, I think, designers should be content, for the time being, if they obtain double the four-stroke result at the *same* cost or the same four-stroke result at a reduced cost.

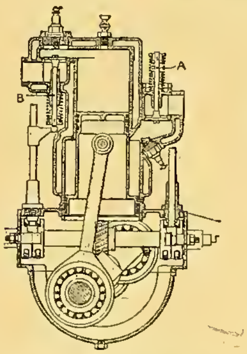


Fig. 1.– The Boudreaux-Verdet bi-duplex engine, having truncated pistons, both parts of which are utilised as power agents.

Of late, however, there have been indications that designers are foregoing simplicity in design by the introduction of valve gear in order to make a two-stroke single-cylinder give the same results as a four-stroke two-cylinder engine, and so long as the added mechanism does not exceed the complication of a four-stroke engine there will be a decided advantage, provided the same results are obtained as in a four-stroke engine with double the number of cylinders.

It is rather surprising, since an impulse per cylinder for every revolution of the crankshaft is the objective, that designers have not given greater attention to the double-acting engine working on the four-stroke cycle. So far, it must be admitted, the four-stroke cycle has proved to be the most efficient, and it would not surprise the writer if six-stroke engines were developed before the two-stroke, as, for economy and over-all efficiency, the six-stroke promises to outdo the popular four-stroke. In any case there is ample evidence to show that the really efficient engine cannot be secured without the introduction of complication, but so long as the results justify the cost this is unimportant.

So far the four-stroke cycle engine has proved to have the best over-all efficiency; therefore a double-acting engine working on the four-stroke principle should offer greater inducement to the inventor and designer than the two-stroke, if only for the reason that the former principle is better understood. With a double-acting engine the number of parts, th weight, the space occupied, and the cost of productio must all be lower than a conventional four-strok engine with double the number of cylinders, which i imitates in impulse torque.

As will be seen from the following table, a double acting four-stroke will give the same impulse effec as a two-stroke, while the six-stroke appears to b entirely out of the reckoning, but it must be remembered that some engineers consider that the net resul with the benefits derived from the two extra so-calle "idle" strokes actually increases the power of th engine. That is, two impulses of a six-stroke wil give more power than three impulses of the four-stroke, hence one may imagine that the four-stroke has a least the same advantage over the two-stroke.

IMPULSE EFFECT OF VARIOUS ENGINES DURING SIX REVOLUTIONS.

1-cyl. 2-stroke	6	impulses	in	6	revolutions
1-cyl. 4-stroke	3	,,	,,	,,	,,
1-cyl. 4-stroke double-acting ...	6	,,	,,	,,	,,
1-cyl. 6-stroke	2	,,	,,	,,	,,
2-cyl. 2-stroke	12	,,	,,	,,	,,
2-cyl. 4-stroke	6	,,	,,	,,	,,
2-cyl. 4-stroke double-acting ...	12	,,	,,	,,	,,
2-cyl. 6-stroke	4	,,	,,	,,	,,
3-cyl. 2-stroke	18	,,	,,	,,	,,
3-cyl. 4-stroke	9	,,	,,	,,	,,
3-cyl. 4-stroke double-acting ...	18	,,	,,	,,	,,
3-cyl. 6-stroke	6	,,	,,	,,	,,
4-cyl. 2-stroke	24	,,	,,	,,	,,
4-cyl. 4-stroke	12	,,	,,	,,	,,
4-cyl. 4-stroke double-acting ...	24	,,	,,	,,	,,
4-cyl. 6-stroke	8	,,	,,	,,	,,

It is strange that almost every double-acting engine so far produced or designed has been at the two extremes of internal combustion engines, viz., the motor cycle and the marine engine. As regards the latter it is interesting to know that several successful engines are now on the market, but in the motor cycle field the designs have not progressed far beyond the paper stage. There is, however, one notable exception, the Frost engine, which we illustrated and described in our issue for February 21st.

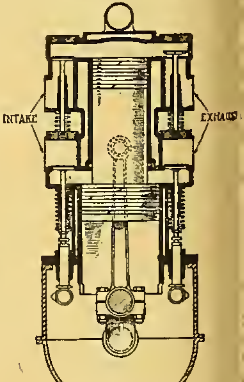


Fig. 2.—An American design of a double-acting engine, the Schoenrock.

A French Example.

A double-acting engine which created a great deal of attention at a Paris motor

The Double-acting Engine.—

shown a few years ago was the Boudreaux-Verdet bi-duplex engine, of which an illustration is given (fig. 1). This engine has truncated pistons, both parts of which are utilised as power agents, explosions taking place both in the lower and upper parts of each cylinder. The upper and lower portions of the cylinder form quite distinct chambers, so that gas cannot pass from one to the other.

The illustration does not give a clear idea of all the details of the working of the engine, as, to avoid confusion, all the valves employed are not shown.

Though the lower portion has a larger diameter than the upper, yet, as it is partly filled by the piston body at all positions in the stroke, it will be seen that it does not contain a correspondingly greater amount of fuel. The gases can only occupy the space *between* this piston and the cylinder walls, and exert their force on the flange or enlarged portion at the bottom, which carries three gastight rings.

Therefore, since each end of the whole piston receives its own impulse from a distinct and separate explosion, the effect is that of an ordinary petrol motor working on the four-stroke cycle with twice the number of cylinders. The explosions are made to alternate, so that when one occurs in the top portion the lower piston is drawing in a charge of gas which is compressed while the upper one is exhausting its waste gases.

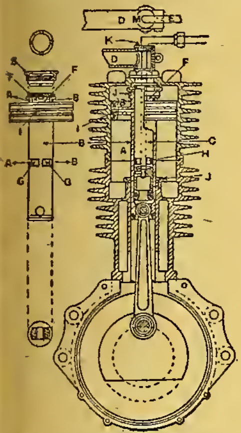


Fig. 3.—A design by Mr. T. Slaughter.

A. Double-acting cylinder.
B. Double-acting piston.
C. Sleeve inlet valve.
D. Inlet pipe.
E. Pressure-fed oil pipe and piston, etc.
F. Inlet ports in piston trunk.
G. Inlet ports in piston trunk.
H. Inlet ports in induction pipe.
I. Lubricating oil channel.
J. Screwed cap to secure piston ring.
K. Screwed cap to close end of inlet pipe.

There are two inlet valves A and two exhaust valves B in one complete cylinder—one inlet and exhaust valve to the upper and also the lower portions respectively. These are operated from a camshaft placed across the engine and driven by a worm gear off the main shaft at a point between the two cylinders.

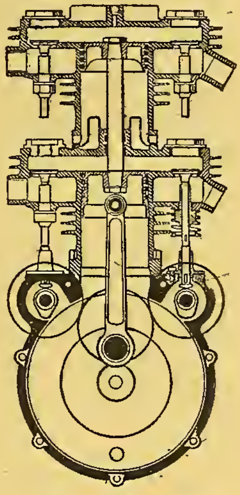


Fig. 4.—The Masters, a design possessing staggered cylinders to bring the exhaust and inlet valves side by side.

An American Design.

The illustration of the Schoenrock engine (fig. 2) appeared in an American contemporary. There is obviously something wrong with the drawing, as the valves of the lower chamber as shown would open when the charge fired. Later designs embodied rotary valves, but the illustration serves to show that the double-acting engine is not being quite neglected in the United States.

Two Air-cooled Types.

The Slaughter engine (fig. 3) is the design of Mr. T. Slaughter, of Coventry. The cylinder is closed at each end and is double acting, since an explosion takes place above the piston and below it alternately. A tubular extension forms the cross-head guide for the piston, as is the case in steam engine practice.

There are four valves. The two inlet valves are of the sleeve type. The exhaust valves are operated by rockers. The exhaust valve for the combustion chamber at the top of the cylinder has a long stem which passes through the inlet port of the lower combustion chamber.

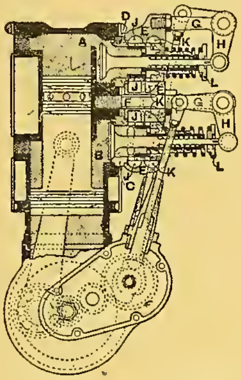


Fig. 5.—A double-acting four-stroke engine patented by Mr. L. S. Parker.

The oil feed pipe passes through the induction pipe in the cylinder head. When a port in the piston registers with a duct formed in the side of the induction pipe at the lower end of the cylinder, the oil is forced through and lubricates both the cylinder and the sleeve valve, the superfluous oil passing into the crank case.

On the firing stroke the pressure is reduced to atmospheric before the inlet ports are uncovered, by the exhaust valves being opened early. The valves, which are of large diameter, can be raised by means of a Bowden wire.

Fig. 4 is a less complicated design than the Slaughter engine, and was invented a few years back by Mr. P. G. Masters, of London. This engine can best be described as a two-cylinder tandem engine. The illustration renders a lengthy description unnecessary. At the lower part of the upper cylinder air ports are inserted to allow the ascending piston to draw in a supply of cold air to cool the piston rod and top of the combustion chamber.

Another interesting double-acting engine was recently described in *The Motor Cycle*. This is shown in fig. 5, and was the subject of a patent granted in 1910 to Mr. L. S. Parker. Each cylinder is provided with main ports A and B, these ports being fitted with fixed casings C and D, which are held in position against their bored-out seatings by the yoke piece E. This yoke piece embraces both casings, and is centrally held to the body of the cylinder by, preferably, a single bolt F. Such a construction gives considerable accessibility to the valves, since by merely releasing the bolt F the yoke piece with the casings may be bodily detached for inspection. The yoke piece E carries the screwed brackets G, to the outer ends of which are pivoted the bell cranks H, the depending arms of these bell cranks engaging the outer ends of the valve spindles of

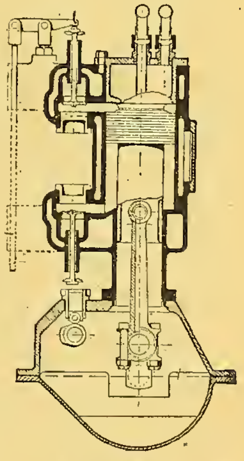


Fig. 6.—A 20 h.p. two-cylinder double-acting petrol marine engine.

The Double-acting Engine.—

the main valves, which control the outlets from the casings into the main ports A and B opening into the cylinder compartments. The valve spindles slide axially within the tubular shanks of movable sleeves, which are themselves adapted to slide within the fixed casings C and D. The fixed casings are each provided with exhaust ports J and inlet ports K, the movable sleeves being also provided with holes adapted (when the movable sleeves are in the position of the upper valve gear shown in fig. 5) to put the cylinder compartments into communication with the inlet ports K. When a main valve is lifted from its seating by the bell crank arm H, the extension of the cylindrical movable sleeve is in a position which opens the exhaust port. The movable sleeve thus acts as a slide valve controlling the inlet and exhaust ports. and is subsidiary to the main valve.

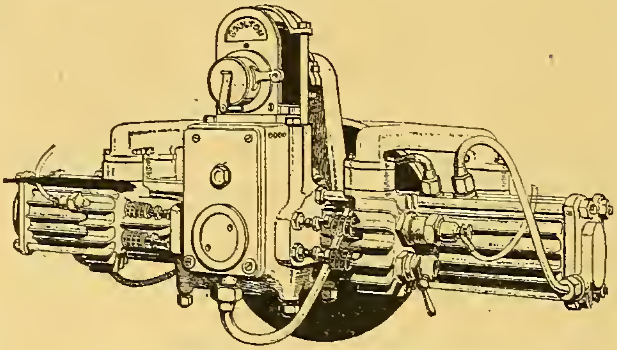


Fig. 7.—The Frost four-cylinder—the latest production in double-acting engines.

Two-step Cam.

The cam is provided with two circumferential steps of different radial depth, and as the cam rotates the action of the lower step is to lift the main valve partially off its seating, this action being timed to take place when the exhaust stroke should commence The same movement of cam and the bell crank H which has thus partially lifted the valve, has brough the collar L against the end of the sleeve, and th exhaust is now open. Further rotation of the car brings the higher step into action, thus opening th valve still further and causing the movable sleeve t shut off the exhaust port and open the inlet, as show in the drawing. The cam then permits the main valv and sleeve to be returne to the closed position.

Fig. 6 is the design o an engine built for marin purposes by Mr. S. E Hale, of Kingston. Thi engine comes nearer t steam engine practice tha any of the preceding designs, inasmuch as bot sides of the single pisto are used.

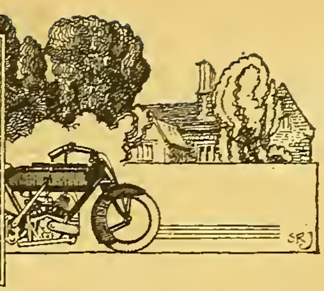
Fig. 7 is the Fros tandem four-cylinder fla engine—perhaps the mos modern example of th double-acting engine.

With the increased knowledge of engine coolin and metallurgy obtained by our engineers durin the war there seems to be promise of the double-actin engine receiving greater attention in the future, whe the torque advantages of the two-stroke would b combined with the over-all efficiency of the conventional four-stroke engine. VEDETTE.

* * *

IN THE LAND OF THE PYRAMIDS.

A despatch rider and his W.D. Triumph in the Egyptian Desert. In the background is the Sakkara Pyramid, said to be the oldest in existence. Cheops, the largest in the world, is 5,600 years old, but Sakkara is much older, and it was probably well over 6,000 years ago that this great monument was erected.



DIVERGENCES IN DESIGN.

A Comparison of Detail Work in British and American Motor Cycles.

THE mythology of the Greeks did not produce a more successful "apple of discord" than motor cyclists have discovered in the never-ailing bone of contention, American *v.* British practice, and it is a great pity that it has become the fashion for certain people immediately to construe criticism as direct attack, and to adopt the customary method of discounting the defects of one school of design by pointing out the deficiencies of *other* parts of the opposing school—a method of arguing in a circle which advances the whole subject not one iòta.

The only satisfactory procedure on which to base comparative criticism is to take each detail of the respective mechanisms and balance one against the other, and so doing leaves no doubt that the commendable features of British design show a sufficient preponderance over the American to indicate that we have less need to modify our specifications according to their ideas than they to modify theirs to ours, always supposing, of course, that it is the great proportion of the home market for which we are catering, *i.e.*, for that large class known as "the average user."

Engines.

Considering power units: Despite his experience with the type as a heavy tractor engine, the American has not yet awakened to the horizontal twin as a motor cycle engine, and, notwithstanding his unnumbered two-cycle boat motors, he has never refined the type for light road transit as we have.

Of four-cycle engines it may truly be said that our single-cylinders are much further in advance of the Americans than his V twins excel ours; in so far as internal arrangements go, the large twins are generally good in design, material, and workmanship, and commendably superior to our own engines both in smoothness and silence of operation and in their manner of dealing with the exhaust.

They nevertheless tend to a certain flimsiness in some of the accessory external fittings, as, for instance, overhead valve mechanisms, inlet domes and cages, valve lifters, and fuel and oil piping and their unions—seeing that the U.S.A. is the home of o.h.i.v. it is curious that none of their manufacturers has designed a method of housing this part so simply efficient as that used on our own Rudge, or Enfield, while the enclosure of timing wheels inside the crank case persisted in many years after the same thing was abandoned in British practice.

In mounting the engine in the frame it is debatable whether the loop frame system would not be better than our own if it were carried out by British manufacturers, but in the States the advantages have been nullified by the use of small diameter bolts and light gauge plates with resultant engine "dither" through wearing of the holes after a couple of seasons' use; our own machines, even the old buck-jumping singles, generally retain the engine in the frame for many years with praiseworthy rigidity.

Frames.

While frame breakages appear to be less frequent among the Americans than with us, I have both seen and heard of a far greater proportion of that infinitely more dangerous trouble—front fork breakage.

The American frames hold together satisfactorily, not so much by virtue of an inherent excellence of design, but because of the quality of the materials employed, and British manufacturers would be well advised to follow suit and abandon the malleable casting once and for all.

The American, however, could never be accused of using much science in his frame designs, and it is, indeed, extraordinary that the country which produces the Ford chassis—so remarkable for the manner in which every ounce of material is apportioned to its particular duty—has failed to give us anything even tending towards the straight-tube ideal which our own designers are at last inevitably acknowledging.

Front Forks.

Whilst our designers have endeavoured to evolve a spring fork in which short bearing pins are eliminated and all working parts are above the wheel, the American leaves his bell cranks and shackles where they are exposed to the mud from the front wheel.

Where is there an American gear-change lever to compare with that of the 1913 Triumph, for example, or where the mudguards equal to those of the Enfield, Clyno, or A.J.S.?

Despite the excellence of the American hubs with their large balls, where are their detachable and interchangeable wheels, with which we are now familiar?

Clutch and Gear Control.

Interlocking clutch and speed controls are no doubt excellent safeguards against mishandling of the gears, but they are a crude method of arriving at a foolproof mechanism; while America cannot show anything in gear-striking tackle to excel the originality of the Douglas or the simplicity of the B.S.A. or Sunbeam.

The question of chain-guarding has really not occurred to the American in the same sense as it has, say, to the designers of the P. and M. or Clyno.

One might go on *ad infinitum,* finding good and bad on each side, but one cannot get away from the fact that, apart from the engine, the general arrangement of the American machine, until recently, has been marked by a crudity which tends to refine itself by a process of Anglicising the fittings.

D.H.S.

"PIP EMMA" MATCHMAKER

The Soliloquies and Observations of a Motor Cycle in the hands of a Flying Corps Despatch Rider. The words used in the article are the terms applied to various letters in field signal work so as to avoid ambiguity, *e.g.*, A is known as ak, B as beer, and D as don to distinguish them from other letters of similar sound.

"There's a girl on me now," said 6000.
LYNN

"CORP., I'm taking the mails to-night!" He uncovered his six-foot length from my flapper-bracket as he spoke, and threw a crumpled envelope at my cousin Douglas, who lay untyred on the other side of the garage.

The Corporal raised a sandy head with a far-away gleam in his eye. "Now what the devil do you want in Salbershot again, Pip? It's not your turn!"

Pip is my master, temporarily, and he is a Don R. He is christened Pip after me, for my name is Pip Emma. He should be a first Ak Emma, but he isn't, because somebody large and braided and Sam Browned found his daughter tidying her hair with the aid of a Leyland reflector and my front lamp!

"My little Corporal," quoth Pip. "If I don't get the Salbershot run to-night it will bring my grey hairs in sorrow to the grave! There's a maiden aunt I have, and she's coming there to see me. I have expectations from her which unrealised will bring me to the poorhouse," and with this, and a flourish of tragedy, he ceased, and sank gracefully on to the bench beside me. Alas for effect, he also sank gracefully into a tin of paraffin.

"Strafe you," said the Corporal, as he strode across the shed and picked up a crumpled ball of paper. "I had to sign for that juice. Yes, Pip, maiden aunts always use mauve paper, with purple ink—and always use purple wax sealed with a pair of hearts and an arrow! No, Pip. Tomkinson shall take the mails!"

"He's on Zepp guard."

"Well, Billy then."

"Cookhouse fatigue."

"Gracious!—Smithy."

"Sick list. He's bobbing."

"Damn you, Pip. Where's that girl?"

"Gone with the second in command to a concert! I told you I was going to take those mails."

The Corporal scowled.

"Your luck seems in, Pip. Well, if you do go—if I *do* send you——"

"Yes?"

"You might bring me back a couple of pounds of Cailler's, and one of those ten bob Flying Corps brooches."

He filled me up with oil and petrol, and fed me with carbide and water, did my master. And then we were ready for the road.

He was "all poshed up," as we say in the Flyin Corps, in his best big pilot's gloves, and a shiny sil scarf, and I could smell Con Amores, or Abdullas in his pocket whenever he came near me. And guessed he'd been visiting the officers' mess.

I tried to tell him how much I disapproved of hi conduct in a series of loud back-fires when he trie to start me.

I hate being kick-started—all self-respecting bicycle do. I like trying to run away from people that ho along beside me. But he told me to shut up, an gave me less air.

A "Nice 'Bus" and a Well-bred Car.

Now let me tell you that I am no ordinary Pip an Emma. I was the pride of Haish Park before I joine this family, and I fondly imagine that I am the prid of our transport here. Consequently I hate bein bullied.

Pip gets a bit too important sometimes—wants coo ing down. So I shut my jaws with a snap (of carbo and refused to spark.

I very much regret to have to tell you, gentle reade what followed. His language grew so heated that warmed me up, and I had perforce to start in spite myself.

"Pip Emma," says he, as he opened me out pa a camp. "Pip Emma, we're on medical hut to-morrov Five o'clock in the morning; what, old thing?"

I really hadn't the heart to be cross with him ar longer—he's such a dear and such company. S "Pip-pip!" says I, "I like medical hut." Thoug I do have to wake up early and shake the sleep ou of my lamps. The girl clerk there is rather a go sort, and understands and appreciates me when I chaperon for her and Pip.

She says I'm a "nice 'bus."

So I put my best wheel forward in the fresh summe dusk, and the dusty hedges were a long streak white as we tore by them.

Be it as it may, we got to Salbershot in record tim leaving the little villages of the plain, all sleepy ar quiet, in our wake. We delivered our mails, and P put me to bed for a bit in a jolly old garage with couple of Crossleys.

I like Crossleys. Sporting 'buses they are; tal most things on top, and nice-natured. Not stuck like Fords or uncouth and grumbly like Leylands.

"Pip Emma."—

"Say, Emma," said "6000," an old Crossley pal of mine, after Pip had gone out. "I've got a girl on ne now." I pricked up my controls at that, for a girl in khaki had attacked me a day or two before, and had nearly finished me. However, I managed to knock her out successfully, with the aid of a few trees and things, and she was still in hospital.

"Yes—and I was three-stepping for her yesterday. Miss Smith,' says the Flight, 'one of your cylinders s missing!' 'My goodness!' says she, and I'm blowed if she didn't start looking for it round the vash!"

Farmer's Cart—Usual Story.

I groaned, for I'd heard that tale before, but re-aliated by making "6000" listen while I told her how our girls had scattered Keatings round the garage and found all the Fords on their backs next day!

It was getting near midnight when Pip came back for me. He fell over "6000's" mudguard, and woke me up with his language. These men have no respect for our feminine ears. Yes—we are feminine.

It was a topping night out, with little bright stars laughing down at Pip, who was so happy with his memories of his "maiden aunt" that he left most of the work to me. I was a little preoccupied, too. I was having an affair with my Cousin Douglas just then, and was wearing one of his piston rings on my handle-bar.

Somehow neither of us noticed a very faint light round a bend, and if we had we could not have stopped. Never a sound reached us, for nobody made a sound, and we swept round the bend doing a good thirty.

Pip wouldn't go on the wrong side of the road for worlds. I can stake my mag. on that. But when we did get round the bend we found a nasty old farmer's cart drawn right across the road.

I heard afterwards that Giles had been into Salbershot, and was asleep in the bottom of the cart; one gets very good beer in Salbershot. What?

We made an awful crash!!!

I heard Pip shout something, but whether it was "Flossie," or "Mother," or merely "Damn," I can't tell.

Then I think I fainted. But I distinctly remember winding my front wheel round a large cart horse's hind leg, and feeling him breathing on me!

I woke up next morning very stiff indeed and sore. I was leaning up against a cottage wall, with red rambler roses nodding round and carressing my poor damaged head, and nobody seemed very interested in me.

Somewhere, about midday I think it was, I smelt the faint aroma of the greasy things that rejoice the hearts and appetites of human people at noon.

Surely that was Pip's voice I heard through a window above me, rather washed out and quavery, but still my master's voice. (Please he's *not* a gramophone!)

I could only hear bits, so you'll have to excuse blanks!

M.M.V.: " . . . . For you!"

A Silvery Soprano: " . . . . I adore Cailler's. . . . too perfectly sweet. . . . ."

Suddenly I heard a "Toot-toot" from the road, which I recognised as being the voice of one of the Crossleys in our family, and a corporal appeared. A sandy-haired corporal, along with "several of my Ak Emma friends, who gathered all round me and looked upon me with very long faces.

"Damn!" said the Corporal several times before he went inside.

S.S.: "He's in here. Yes. . . . terrible. . . . ankle . . . . three or four days . . . . *love* having him . . . . Do have a choc . . . . Cailler's, rather nice . . . . Yes . . . . knew him years ago . . . . Eastbourne . . . . sight of him . . . . topping . . . . Yes. What? Sweet little brooch . . . . Yes . . . . lots of R.F.C. people . . . . Yes, quite new . . . . fetch them in to have some tea."

Then she came out. You probably guessed that the silvery soprano was owned by a "she"? And she was fairly pretty, too, as women go—the yellow, fluffy-haired type, for which I have no use. They don't know an armature from a big end!

She started talking to the Ak Emmas at the tender. Then I heard some more conversation.

M.M.V.: " . . . . Devil's own luck. . . . Court of Inquiry. . . ."

Corporal's Voice: " . . . . Damages. . . . Yes. What about the mauve letter lady?"

M.M.V.: " . . . . in the same street . . . . topping little . . . . chums, you know."

C.V.: " . . . . Blank blank cheek . . . my chocolates . . . . say to my little girl . . . . mine . . . . Blank blank . . . ."

M.M.V.: " . . . . uating circumstances . . . . owe you ten bob for it . . . ."

I'm lying in a shed now feeling perfectly dud. All alone except for a sister Pip Emma that the colonel's car chewed up last week, and the remains of a Ford that a Rumpety landed on.

A-courting.

It's beastly not seeing cousin Douglas, but I hear him sometimes. I'd know his bark anywhere. He belongs to a thing they call a "Pilot," and he is very well fed!

I'm s'posed to be waiting for a court of inquiry, and flight sergeants and transport officers and things come and check me every now and then, and lots of nasty humans come in in scores to stare.

On Sunday afternoon the yellow fluffy-haired girl came in with Pip to stare at me, with her grip through Pip's handle-bar.

She was got up in something blue and white, and I managed to get a lovely jealous smear of grease on to it when she stroked my tank and called me a "Dear blessed old bike."

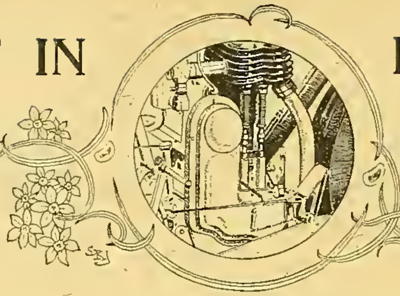
We crashed four months ago, and Pip was still limping on one wheel (they are *some* time about sending me back to Fairborough), otherwise he was looking frightfully cheery and swollen-headed. The fluffy girl had some sort of a brass or copper washer round her third finger on her left handle.

The other bike and I thought it expedient to look the other way and talk about erstwhile mauve letters and carbo-hydrates and explosive mixtures and things as Pip folded his handle-bars round her—our shed wasn't very public.

But we couldn't help hearing several backfires.

SOPHIE C. ELIOTT LYNN.

JUDGMENT IN LUBRICATION.

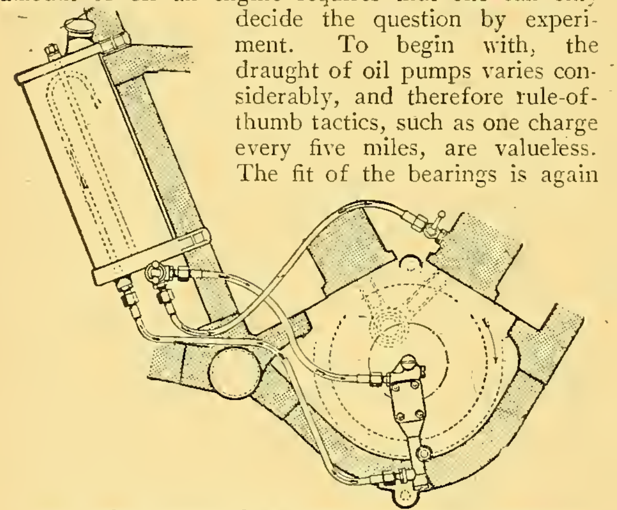


Advocating Mechanical Feed with Visible Drip and Tank Adjustment.

IS there one rider in a thousand who can truthfully claim such intimate knowledge as to the requirements of his engine that he never over-oils? One meets plenty of expert riders who talk learnedly about the importance of oiling "just-so," but how many of them are as infallible as they would make believe in manipulating present-day oiling apparatus? Personally, I acknowledge the fact that on mounting a strange machine I am hopelessly at sea for the first 100 miles or so, and am usually guilty under such circumstances of considerably over-oiling.

Deciding Factors.

So many factors are at work to determine the amount of oil an engine requires that one can only decide the question by experiment. To begin with, the draught of oil pumps varies considerably, and therefore rule-of-thumb tactics, such as one charge every five miles, are valueless. The fit of the bearings is again an all-important factor; for instance, an engine brand-new from the works may require a charge every mile or so, whereas the same engine after 1,000 miles running will demand only the same quantity every eight miles over similar going. The quality of the oil is almost as important; with one brand of oil I used one charge was necessary about every nine or ten miles, whereas with the ordinary quality stuff, purchased at garages, the same quantity would be quite used up in four or five miles.



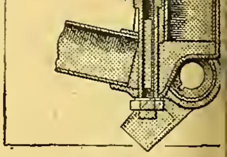
The Enfield mechanical oil system of lubrication, showing the path of the oil during its circulation.

Tackling a Strange Mount.

In mounting a strange machine the following is a pretty safe mode of procedure. Start up the engine and allow it to run warm, and slowly administer oil till smoking begins. You then have a fairly safe foundation on which to work. Run, say, thirty miles, giving two charges *en route*, and at the end of th distance see how many charges it takes to bring tl engine to smoking point again. This ascertained, yo have a pretty fair idea as to the miles per charg and as time goes on you are able to judge as to ho far you can cut down the supply.

Most engines instantly give warning, by their absence of silkiness, immediately the oil sinks below its proper level, whereas they give no indication of the fact that they are over-oiled, except by smoking—not always visible from the saddle —till plug troubles begin.

Practically every rider offends in the direction of over-oiling rather than under-oiling. Should a breakage occur he is in mortal terror of being told by the manufacturer that he has been guilty of under-oiling. Such an accusation is a slur on his abilities as a rider and upon his very manhood. Therefore he wastes oil galore, suffers the inconveniences of an oily engine, compels himself t decarbonise more often than should be necessary, an probably endures plug troubles into the bargain. Aft six months the exterior of his engine is in a filth state, the high-tension wires adjacent to the magnet are saturated, and he has ruined two pairs of boots.



The system of automatic oiling used on the Scott motor cycle.

My advice is—do not be bullied into it! Find out the minimum of oil your engine requires, and do not indulge in constant flooding. When after eight months' riding a timing pinion strips or the tank comes loose, and the manufacturer wants to make out that under-oiling is the cause, ask him why, in the name of all that is wonderful, he does not make a proper engineering job of his machine and introduce some spirit of progress by employing mechanical lubrication—like the Americans! That will dry him up.

The Triumph system of lubrication is a simple hand pump. Several other eminent makers still pin their faith to this method of oiling.

The one fault with all mechanical lubrication systems of to-day is that the feed is not visible. It would be very desirable, I admit, to have an oil pump contained

Judgment in Lubrication.—

in the sump, with no external fittings or pipes whatever, yet the necessity for a visible drip is a very real one. Without such it is difficult to acquire proper confidence in the system, and in cold weather you never quite know where you are. If the pump were contained in the sump, and there were no external fittings through which oil was to be forced, then the draught of the pump would not be so much affected by the temperature of the atmosphere, but still the sight feed would be a useful check. Say, for instance, that one is riding in very hilly country. On very long descents it is necessary to shut off the oil completely, while on the succeeding ascent a double supply is required. How very much more convenient it would be to make these adjustments by means of a turn needle in the tank than to have to get off and readjust the pump!

The Harley-Davidson mechanical oil pump. There are no check or other valves.

Whatever the system, hand adjustment is necessary. The throttle-controlled pump comes very near perfection, but it makes no allowances for the varying viscosities of the oil used. This can only be done by means of hand adjustment, the drip being set to feed a minimum supply, and an emergency hand pump used in addition.

It may be claimed that the drip has not proved satisfactory—a claim with which I heartily agree. The rate at which the oil passes depends on the position of the plunger when the adjustment is made. If the rate of drip be about right with the spring fully compressed—*i.e.*, the pump at the bottom—the oil will hardly drip at all when the spring is relaxed by the plunger rising. The whole system, so far as a fixed setting is concerned, is utterly hopeless, and most riders simply unscrew the needle and use the pump as a direct hand pump. With mechanical feed, however, administering a constant pressure, one could really set the drip to pass a correct supply, in just the same way as if it were invisible, and a full charge of the hand pump when conditions demanded would see one through. Thus the visible drip, while affording a real convenience imparting confidence, would not detract in any way from the present efficiency of the system.

Crank Case Suction.

Though I am aware that many riders do not at all like those automatic systems dependent on crank case suction, I, personally, consider them infinitely superior to the ordinary spring-loaded plunger. The adjustment, at any rate, can be fixed to feed a constant supply, and need not be upset in order to administer an overdose. The trouble with them is that the rate of flow is so considerably determined by the viscosity of the oil used—a state of affairs which would apply much less if the oil were positively driven by a mechanical pump.

The main object of these meditations is to illustrate the fact that, whatever the future may reveal in the way of oiling systems, some judgment will still be required of the rider in the way of adjusting the supply. Personally, I favour the idea of mechanical lubrication with instantaneous hand adjustment and supplemented by hand pump. It is a mistake for manufacturers to aim at an oil feed that will require no adjustment whatever except under very exceptional circumstances. From what experience I have had of such systems they are not satisfactory, and require more adjustment than their designers ever calculated. If, then, we are to have hand adjustment, let us have it accessibly and visibly placed, and including a sight feed, which is invaluable in assisting one's judgment. Judgment is essential but not infallible, and it makes a suitable partner for the mechanical method. CHINOOK.

* * *

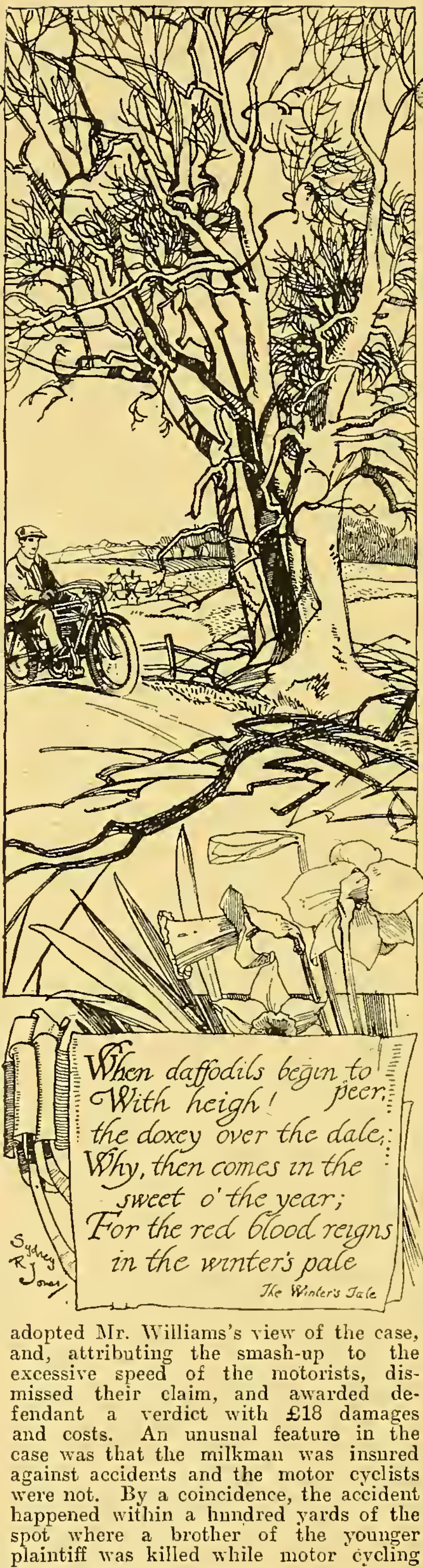
"NOTHING TO BUY BUT THE LICENCE."

A Plea for the Completely Fitted Motor Cycle.

THE above is the title of a recent editorial comment in *The Autocar* dated March 30th. The point of the remark is, of course, that car manufacturers should turn out their cars after the war absolutely fully equipped, so that the purchaser will not be compelled for some time after the purchase to be continually buying small extras that could quite well have been incorporated with the car.

The same doctrine can certainly be applied to motor cycles. The fitting of reliable and well-made accessories at the present time is a job that often taxes the powers of the novice both with regard to the choice of the accessories in the first instance, and their actual fitting in a really secure and reliable manner afterwards. Also there is the annoyance of the discovery that after having paid £70 for a motor cycle one must put one's hand in one's pocket again to the tune of some ten pounds for lamps, horn, etc., before one can venture on the road. If the machine is to be fully equipped the expense will probably exceed £10, covering, as it will, a first-class lamp set, mechanical horn, and a reliable speedometer. If it is a sidecar outfit and the owner is ambitious, a dynamo lighting set will be essential, and added to the actual cost of the set and that of fitting, there is the item of time lost in the use of the machine while the accessories are fitted. The makers could fit these accessories in much less time, and consequently the owner would not have to surrender the use of the machine for a time shortly after having purchased it. Consequently, we think manufacturers would do well to give serious consideration to the question of turning out their machines completely equipped ready for the road. If they see any objection to this policy as applied to every machine that leaves their works, perhaps they could list a machine really ready for the road as well as their ordinary models sold short of lamps, horns, and such vital accessories.

CURRENT & CHAT


When daffodils begin to peer,
With heigh! the doxey over the dale;
Why, then comes in the sweet o' the year;
For the red blood reigns in the winter's pale
The Winter's Tale
Sydney R J Jones

Times to Light Lamps.

SUMMER TIME.

Apr. 11th	8.16 p.m.
,, 13th	8.20 ,,
,, 15th	8.23 ,,
,, 17th	8.27 ,,

The National War Funds.

The National Relief Fund (distributed £3,793,657)	£6,353,720	0	0
British Red Cross Fund	9,775,694	0	0
Tobacco Fund	151,055	0	0

Neglect.

Judging from the rattle of many motor cycles now used "on work of national importance," their owners or drivers do not give their machines the same attention as the average pre-war motorist used to give to his mount, however decrepit it might have been.

Sidecar Ambulances.

These are doing well with the French Army in the Vosges district, cars having had to be abandoned, owing to the rough country. A previous member of our staff, C. F. Haywood, now in the R.N.A.S., was driving one of these cars.

Morocco.

The Acting British Consul at Casablanca, in reporting on the trade of Morocco, states that the prospects for business in motor cycles and accessories deserve the special attention of British manufacturers.

Cornering at Forty Miles an Hour!

Ex-Cpl. Eric Williams, D.C.M., of T.T. fame, has just added to his varied experiences of life that of being a witness in a civil action. At Hereford County Court, before Judge Tobin, K.C., two motor cyclists, father and son, farmers in Herefordshire, sued a Hereford milkman for £35 damages for personal injuries and repairs to a sidecar outfit, the defendant putting in a counterclaim for £24 damages to his milk float. The motor cyclists met the milk float on a blind corner in the city in October last, and there was a bad smash. The case turned on the question of speed. The motorists swore they were only going from eight to ten miles an hour, but prominent citizens who came on the scene gave evidence of road scars in the track of the motor cycle for a distance of thirty-two feet. It was on this point that the T.T. holder's opinion was very useful to the Court. Mr. Williams, who since being discharged from the Army has been, and is now, in charge of a tractor ploughing unit in Herefordshire, expressed the expert opinion that the motorists must have been going thirty miles an hour. He also had one or two interesting things to say on motor cycling. For instance, he said an expert motor cyclist could with a twin-cylinder combination outfit take a right-angle corner safely at twenty miles an hour; he had done it at forty! The Judge adopted Mr. Williams's view of the case, and, attributing the smash-up to the excessive speed of the motorists, dismissed their claim, and awarded defendant a verdict with £18 damages and costs. An unusual feature in the case was that the milkman was insured against accidents and the motor cyclists were not. By a coincidence, the accident happened within a hundred yards of the spot where a brother of the younger plaintiff was killed while motor cycling two years ago.

Glad of the Petrol Restrictions.

We have discovered him at last—the fatuous optimist who can see good in the petrol restrictions. He is a neighbour of ours—that is, a neighbour of position, not of sentiment—and came in to see us after a fifty-mile business journey on his motor cycle. He said, "I am glad there are restrictions, I am glad we cannot ride as we used, I am glad we cannot watch young men aspiring at 100 m.p.h., I am glad there is no likelihood of violent sea-sickness in getting to see a motor cycle race. If all these things were as of yore the garage proprietor and small repairer would soon be all millionaires and more independent than ever, because yellow gold would be pouring into their pockets all day long—and every day, too—in payment for repairs to broken frames as a result of the condition of war-time roads. I can hardly sit down after having travelled fifty miles; but 200 miles used to mean nothing to me. Therefore I am glad of the restrictions; and may they endure till our roads are roads once more."

Special Features.

THE DOUBLE-ACTING ENGINE.
STUNT FLYING.
HORIZONTAL COUPLE.

Activity on the Metropolitan (Police) Front.

During the week-end we saw numerous cars standing outside the prominent London hotels, such as the Berkeley and Ritz, and the drivers were being interrogated by the police; while a police trap was working in St. James's Park at mid-day, and we saw a motor cycle and sidecar stopped. It is clear that the police are making stringent enquiries as to the use of motor vehicles in the Metropolitan area, and those who are using petrol unlawfully will doubtless be made to suffer heavy penalties.

Unanswered Query.

If the gentleman from Stevenage wh wants some information and help *re* New Hudson twin motor cycle wil address his query in a proper manne and will observe the rules printed ever week on our Questions and Replies page we will try to help him. Our only clu to the whereabouts of the enquirer is th postmark on the envelope of his lette and we are rather afraid that a lette from us addressed to "Constan Reader," Stevenage, might fail to reac its destination.

The Walking Encyclopædia Again.

We were recently asked a question th answer of which involved a knowledge practically all there is to be known abou bomb dropping from aeroplanes.

All that we ever undertook to do wa to give our readers help in motor cyclin matters, and this is all we can promi at the present time, though in th particular case we were able to satis the enquirer's thirst for knowledge.

Chinook" on Active Service.

Our contributor "Chinook" is in rance, driving a sidecar ambulance.

ockefeller's War Bonus.

A war bonus of £600,000 is being given y the Standard Oil Co. to its employees.

iction in Motor Cycling Paper.

Our American contemporary, *Motor ycle and Bicycle Illustrated*, is now inning a serial which promises to be s exciting (!) as any of the "To be ontinued" film stories.

ight Cars for the Army.

A special squadron of about one dozen wner-drivers of light cars, which must ot be of American manufacture, are equired by the Middlesex Motor Volunteers, Southern Group, for important ork. Those possessing such vehicles, ho are willing to serve, should apply Capt. A. Horsfield, Messrs. Selfridges, lotor Department, Oxford Street, London, W.1.

oes the Petrol Controller really exist?

He does, and his address is 19, erkeley Street, London, W.1. Will all hose readers who have read *The Motor ycle* since its first number, and have ever missed an issue or a page, please ote? We are still receiving in fair umbers every day the query, "Can you ell me to whom I should apply for a ermit to buy petrol?"

ritish Quality.

According to the opinion of a driver the A.S.C., M.T., who has driven verything from a 3 ton lorry to a two troke lightweight, the English motor ycle undoubtedly stands supreme in the ests to which it has been subjected. he American machines, he says, have stablished a reputation for reliable unning which they have not justified nder war conditions.

conomy?

A West of England motor cyclist recently smashed up his big twin engine by dopting a policy of false economy. A riend employed at a sawmill sold him a uantity of "special" lubricating oil at low price, and after running a little ime on this oil the big end seized and recked the engine. It afterwards transired that the "special" oil was ibricant which had been used in a as engine, and not only had it been obbed of its lubricating qualities, but as well mixed with fine sawdust. Once iore, we reiterate there is no economy cheap and poor quality lubricants.

verseas Trade.

A Canadian soldier who is in an nglish convalescent camp writes: "If ome scheme such as you mention in your rticle, 'Overseas Trade Development,' the issue of March 14th, could be tarted, it would be a revelation. In ancouver, B.C., there are not more than wenty-five or thirty English motor ycles, while there are hundreds of ndians, Harley-Davidsons, Hendersons, eerless, etc. I am quite convinced that here would be really a big trade in anada for light, reliable machines, if hey could only be purchased at a easonable price."

Motor Cycling Police.

Almost every town of any size in the United States has its motor cyclist policemen.

Synthetic Rubber.

A company has been formed in Sydney, N.S.W., with a capital of £30,000, to acquire inventors' rights in a new compound intended to replace rubber.

Police and Motor Cyclists.

Police have been stopping all civilian motor cyclists, including riders of sidecarriers that work in the Woolwich, Greenwich, and Eltham districts. Two members of the Woolwich club—holding special permits—were held up and licences, etc., demanded.

The Industrial Reconstruction Council.

Mr. Otto Thomas has been elected a member of the Executive Committee of the Industrial Reconstruction Council, and hopes to be of service to motor cycle manufacturers in that capacity. He will be glad to hear from any manufacturer who would like to know more of the work of the Council. Address c/o *The Motor Cycle*, 20, Tudor Street, E.C.4.

Motor Cycle Engineers' New Posts.

Certain motor cycle engineers in the S.E. London district, who received recent notices terminating their engagements, have now accepted engagements at a certain new aeroplane factory in the London district, where skilled engineers are urgently wanted. The transfer from munitions was effected through the engineers' advisory officials, and their motor cycle experience should prove of service to the workers.

Rumanian Oil.

Reports from German sources state that Rumanian oil supplies are much less than last year.

Police Trap.

We are informed that a police trap is in evidence near the Swan Inn on the road over Clapton Common, N.

Japan.

Traders in Japan are sending out enquiries for motor cycles and sidecars, for which there are great possibilities in that country, owing to the narrow roads, which are unsuitable for large cars.

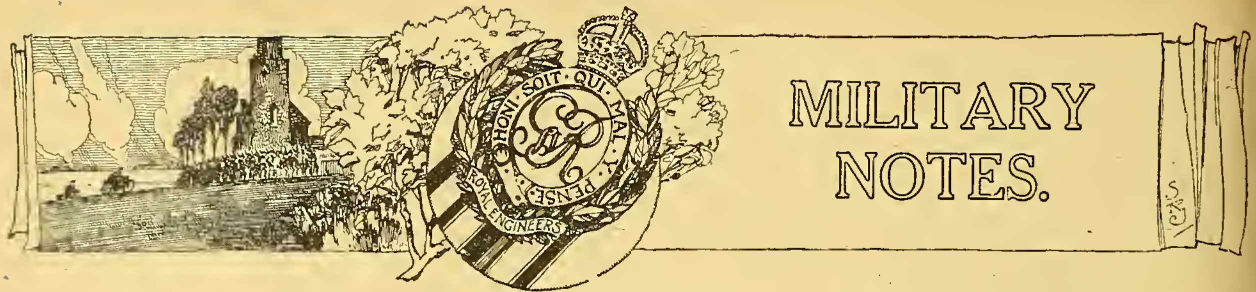
More Matchless Solos for Italy.

On Wednesday last week a horsed lorry was seen outside Woolwich Railway Station, with a number of new Matchless solos in light crates and stencil lettered, "Matchless Motor Cycles for Italy." Judging by the light, open crates, they were consigned by the overland route, *viâ* a certain French port.

A Harley Mystery.

Who is the driver of a Harley sidecarrier outfit to be seen daily in South London who wears a civvy pre-war Brooklands outfit and a silver badge? His identity is concealed by a brown leather helmet and goggles. A policeman at a point crossing held up the traffic on his approach, and gravely saluted the rider, who returned it. What are the contents of the sidecarrier? Who is the rider? A former famous despatch rider's name is mentioned. He is attracting attention at places as far as Woolwich and Bromley, besides the City and West End, and his skill in handling the mount is commented upon.

An instance where a sidecar outfit is utilised to its limit of usefulness. Mr. Cecil Hartshorn, who sends us the photograph, says the Norton stands up to the work splendidly.


HONI SOIT QUI MAL Y PENSE
ROYAL ENGINEERS

MILITARY NOTES.

The M.M.G.S. does something in France. Saving a Tank Single-handed.

CANADIAN TANK BATTALION.

OVER seventy officers in the Toronto district have volunteered for service with the Canadian Tank Battalion.

* * *

HENRY FORD.

MR. HENRY FORD, writing to the *New York World*, says: "I am still a pacifist to a certain extent—that is, I want peace, but I am fighting like the devil to get it."

* * *

S. R. AXFORD AS A STAFF OFFICER.

WE note with pleasure that Lt. (Temp. Captain) S. R. Axford has been appointed a staff officer (second class) in the Air Ministry. S. R. Axford was well known to our readers as a skilful and experienced motor cyclist before the war.

* * *

SIXTY MILES A DAY.

GNR. L. ALLEN, of the M.M.G.S., sends us a photograph of his Douglas, together with a chatty letter. He says: "The old 'bus has been going strongly for the last eight months, doing on an average sixty miles a day. I think this is rather a record, especially considering it has not been in dock. I went to France early in 1915 with the 4th Battery, and was in the Hill 60 stunt, where we figured pretty well. With the best of luck to *The Motor Cycle*."

Gunner Leonard Allen, M.M.G.S.

D.R.'s IN THE CAMBRAI STRUGGLE.

CPL. A. W. BYERS, who is a member of the Sunderland and N.E.A.A. clubs, says in a newsy letter that he went through exciting times during the great struggle at Cambrai. He says he met several men who were associated with the motor cycle world before the war. Among them were Frank Beyley (Enfield), Fred Turvey (B.S.A.), Hal Hill (Zenith), and Serrett (Triumph). All were fit and smiling when he last saw them, and eagerly looking forward to future days of keen and friendly competition.

* * *

THE MOTOR MACHINE GUN.

IN the recent fighting the Canadian motor machine guns played a splendidly gallant and useful part. This is the first time that mobile machine guns have been able to be used for a long time, and, of course, it is due to the fact that we are now engaged in a war of movement. Their use proved, in the words of a Brigadier-General that "cavalry against organised machine guns with Canadians firing them is useless." At one point where the Canadian infantry were in difficulties a motor cyclist private was sent to fetch up the armoured cars, and, he having got through successfully, they came to the rescue and beat off the enemy. Thanks to his prompt assistance, cars, some Tanks, heavy artillery, and infantry were able to extricate themselves from a very dangerous position.

* * *

MILITARY CROSS AWARDS.

A GLANCE through the list of officers who have recently received the Military Cross shows that two of the awards go to lieutenants of the A.S.C., M.T.

Lt. L. T. Maplestone, A.S.C., received the award for conspicuous gallantry and devotion to duty when in charge of lorries dumping ammunition. The dump was heavily shelled all day, and he remained at his post, though wounded, directing operations and getting all the lorries away safely. By his courage and coolness he set a fine example to all who came in contact with him.

Temp.-Lt. P. W. Vernon, A.S.C., gained the distinction for conspicuous gallantry and devotion to duty when in charge of two caterpillars with guns for his battery. Seeing one of the cartridge dumps on fire, he and his men immediately went and extinguished it, without other assistance in any way, thus saving the majority of 2,000 cartridges.

NO MEDAL FOR GALLIPOLI OPERATIONS.

NO Imperial Medal and no speci Star are to be issued for tl Gallipoli operations.

* * *

GROUP ENLISTMENT FOR ME OVER AGE.

MEN over military age up to 50, wl volunteer for home service in tl Royal Garrison Artillery, may e list in groups of ten to twenty. Ea group will be posted to a unit for coa defence as near their homes as possibl and the men will be given a guarant that they will be kept in that unit.

* * *

SAVING A TANK.

WE have just heard that Stanley Cy Hunt, who two years ago enlist in the M.M.G.S., has been pr sented with the M.M. and certificate l the Brigadier-General for conspicuo bravery and devotion to duty at Ypr and Cambrai. He brought an abandon Tank safely back to our lines singl handed under heavy shell fire.

Pte. Stanley C. Hunt, who brought an abandoned Tank back to our lines single-handed

THE MOTOR CYCLE AVIATION SECTION

The enormous importance of the Air Service needs no emphasis: it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouraging of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

How to Join the R.A.F.

details were published in *The Cycle* for March 21st. The earliest which a candidate can be admitted officers' cadet wing is seventeen and ten months.

◇

200 Miles in 2h. 38m.

American airmen, Maj. Ryan and Frost, have flown from Foggia to , a distance of approximately 200 in 2h. 38m., with one stop at s.

◇

nquisher of Fifty-four Aeroplanes.

t. J. C. McCudden, V.C., D.S.O. bar), M.C. (and bar), M.M., and de Guerre, has accounted for fifty- enemy aeroplanes. His brother, Lt. McCudden, M.C. (who is reported g), is credited with having brought eleven enemy machines.

◇

British Aircraft Industry.

iteh-ad Aircraft, Ltd., has obtained sanction of the Treasury to issue l up to £1,000,000, and has recently d the public to subscribe to an issue 450,000 in ordinary shares as part above.

◇

The Private Aeroplane.

possibilities of the "private" lane as a commercial proposition are nised by at least one large aeroplane rn, which has designed and built a solo machine which, it is said, takes ery little more room than a car, and cost no more than the average car e-war days. It is fitted with a com- ively low-powered flat twin engine maker well known to the readers of *Motor Cycle.*

Articles on Flying.

Under the title "Flying Facts and Theories" the following articles on aviation, by W. G. Aston, A.M.I.A.E., have appeared during the last six months:

1917.
Oct. 11th.—"Relative Motion."
„ 18th.—"Mono-, Bi-, or Tri-plane?"
„ 25th.—"Pusher or Tractor?"
Nov. 8th.—"Air or Water-cooled?"
„ 15th.—"Relative Motion and Momentum."
„ 22nd.—"Some Points about Screws."
Dec. 6th.—"The Radial Engine."
„ 20th.—"Some Further Points about Screws."
1918.
Jan. 3rd.—"More About Turning."
„ 10th.—"The Influence of Altitude."
„ 24th.—"The Feel of the Machine."
Feb. 7th.—"A Reply to Further Criticism."
„ 21st.—"The Inconstant Wind."
„ 28th.—"Gusts and Their Effects."
Mar. 21st.—"More About Gusts."

During the same period articles on aeroplane engines were published.

1917.
Nov. 29th.—"About Aero Engines."
Dec. 13th.—"The Rotary Type."
„ 27th.—"The Radial Type."
1918.
Jan. 17th.—"The 260 h.p. German Mercédès Aero Engine."

THE VICTOR AND HIS VICTIM.
A British pilot seated in a Boche Albatross, which he had forced to land in our lines.

Flying in N. Africa.

Three French aeroplanes flying in Algeria recently covered 469 miles in 7h. 22m.

◇

German Imitation.

The Germans are imitating types of British engines which we made some time ago, but have since vastly improved.

◇

An Aerial Postal Service.

The Times states that an aerial postal service between Petrograd, Moscow, and the Crimea, and between Petrograd and Sweden, will be introduced in the near future.

◇

Public Schools and the Air Service.

King Edward's School, Birmingham, claims to have a higher percentage of its old boys in the Royal Air Force than has any other school.

◇

Henry Farman.

Henry Farman made the first circular flight (1,093 yards) in Europe at Issy, France, on January 13th, 1908. On May 30th of the same year he flew 1,360 yards with a passenger, the first public passenger flight. Five months later he made the first cross-country flight from Châlons to Rheims—16½ miles.

◇

Aeroplanes for the Transport of Wounded.

Experiments have recently been made by the French authorities as to the suitability of aeroplanes for transporting wounded from the front line dressing stations to the base hospitals. These aeroplane ambulances can travel at a speed of eighty miles an hour, and while in flight are free from the shocks usually experienced by road ambulances.

STUNT FLYING.

I.—ITS NECESSITY. By "Torque."

The following is the first of a series of articles which will deal with trick flying in most of its aspects, concluding with diagrams illustrating the principal stunts and the methods of performing them.

THE term "stunting" has almost risen to the dignity of classical English, and is, of course, the pilot's term for trick flying. During the last ten years the various manœuvres now known as "stunts" have undergone weird transformations. They were originally performed quite unintentionally, and resulted in the death of the stunter. They are now performed deliberately, either to save the life of the pilot or to slay somebody else. By way of preface, it is advisable to explain why the fighting pilot must be a first-class stunter. This necessity hinges round two facts. The first is that there are no trenches or dug-outs in the air, nor indeed any other type of genuine hiding place, excepting clouds. Clouds are extremely tiresome objects. They appear in vast numbers and great density when you are bombing on a moonless night, and particularly pray for a clear sky. But if your gun has jammed, and umpteen members of the Richthofen travelling circus are diving on to you, the nearest friendly cloud is usually about two hundred miles away. Consequently, when a fighting pilot is outnumbered or taken by surprise, or his ammunition belt is used up, or his guns have jammed, the air usually offers him no cover, and his one hope of escape is to offer his foe an impossible target. Consequently he stunts like mad. He makes his aeroplane gyrate like a tipsy leopard with a fire cracker hitched to its tail.

Marksmanship in the Air.

Marksmanship in the air never approaches the certainty normal on ground ranges. A gun mounted on a platform (to wit, the nose of an aeroplane) travelling at 130 m.p.h. cannot be expected to produce Buffalo Bill shooting, even at a stationary target: but when its target is a stunting aeroplane—*i.e.*, an object executing incalculable frisks in lightning whorls—the chance of a hit becomes even more remote. Cynics liken the machine gun to a blunderbuss. Disgruntled rifle merchants remark that they could hit anything if they could pump out lead at the rate of 500 bullets per minute: but it must be remembered that a "group" of 20ft. in diameter at 100 yards range is not bad shooting for a Vickers in the air, and you may often put fifty shots into a 20ft. ring without hitting the enemy pilot or his tanks, or, indeed, without grazing his tailplane. Moreover, the fighting scouts seldom carry swivel guns. The guns are rigidly fixed to the aeroplane, and are aimed by pointing the aeroplane bodily at its target. Consequently a series of crazy stunts sets the opposing gunner an awkward task.

The Pilot's "Funk-hole."

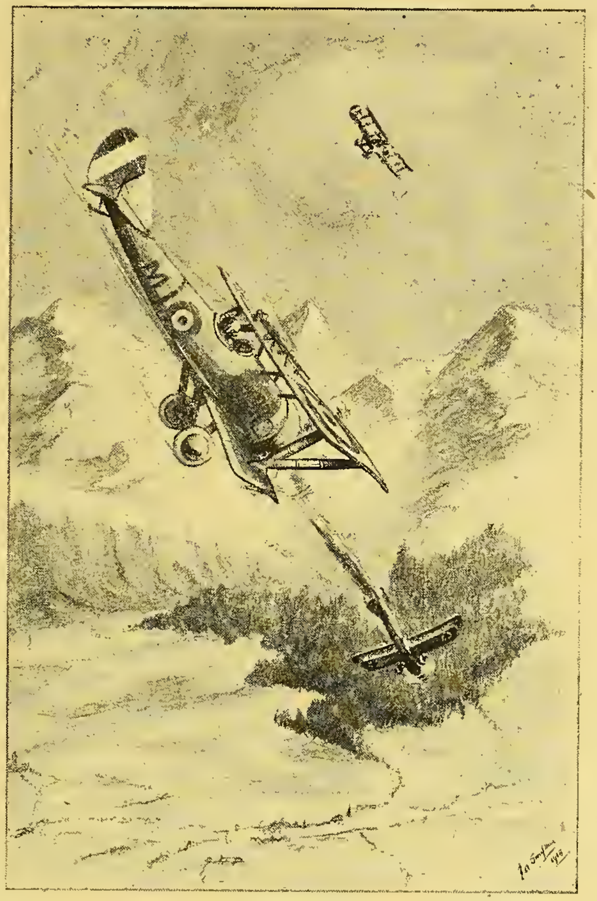
Stunt flying is unquestionably the pilot's "funk hole." Nor is it in any sense a libel to assert tha the fighting pilot needs a funk-hole, for if surprises on sea and land are the commonplaces of warfare, a surprise in aerial fighting is infinitely simpler to effect and infinitely more dangerous. The pilot's view i restricted by many factors. If he be flying a rotary the windscreen in front of him may be smothered wit oil. He may get a fly in his eye. He may be devoting his spare attention to freeing a gun stoppage, or tinkering with his oil gauge, or reading an instrument. In any case, his eyes are limited to quite a small pane of the horizon. When you are controlling a projectil moving through space at more than double the spee of the Scotch express, you do not enjoy many opportunities of looking behind or around. Below you, th lower plane blots out a great deal of what lies immediately beneath. Upper planes are variously disposed Sometimes they frankly and unashamedly cut off th overhead view as thoroughly as the roof of a railwa carriage. Sometimes they possess so-called "transparent panels," which on occasions are no more transparent than goggles in a snowstorm, or the glass of

Stunt Flying.—

motor bicycle sight-feed lubricator. Sometimes the upper plane is at such a level that its trailing edge decapitates you very neatly in a landing crash: it may be your own fault that your body is not a stock size, but the painful result is that you divide your time between looking over and under that infernal plane. Your ears are no help to you. An engine, bigger and noisier than ever graced a racing car, is bellowing furiously just under your nose, and the last thing that you desire is that it should sigh into silence. A yard or two to the front the propeller is threshing like a power saw in a Canadian lumber mill. You can see little, and hear less. Fritz quite understands the possibilities of waiting upstairs in a cloud, and diving on to you unbeknownst from astern. He is also aware that if you are driving towards a dazzling sun there are chances of a furtive approach from many points. You may be the bravest and most alert pilot in the two hemispheres and yet fancy you are alone in the empyrean until a staggering blow on your shoulder or a weird whistle past your nose, or the streak of a flaming bullet, or a chunk of wood flying from a splintered strut, or a bracing wire suddenly flapping loose, tells you that a Boche is sitting on your tail, spitting death at you. If you let him hold his aim a fiftieth of a second longer, you may sign your own death warrant, wherefore you stunt like the very dickens in self-defence.

Defence soon merges into the offensive. As you stunt, your brain, strung by the cold smack of frightful peril, suddenly informs you that Fritz—whom you can now see in the intervals of looping and rolling and side-slipping—is about to do so-and-so: and, further, that if you retort by doing so-and-so, the next pulse beat will set you on his tail. For an instant he will be the blind man instead of you: his forward pointing guns will be out of action, as yours were just now, when he loosed off at you. You try the dodge: and if your brain and muscles possess that split-second, forked lightning kind of co-ordination without which no scout-pilot can survive for two days at the Front, you may "crash" him.

Stunt-flying thus has affinities with both defensive and offensive fighting. In this respect it resembles what ground fighters know by the name of "cover," and is an essential part of tactics. It may further be compared to the "feint," since you can use it to deceive a watchful adversary as to your own intentions, whether in advance or retreat. It includes the counter-attack, of which the case cited above is a good example. It is so vital to aerial fighting that pilots still quarrel as to whether stunting is less or more important than gunnery, speed, and climbing.



AERIAL WARFARE ON THE ITALIAN FRONT.
A fast Nieuport fighting patrol is successful in an encounter with an Albatross and sends it down, crashing to earth, in flames.

THE PROGRESS OF AVIATION.

Some Remarks of a General Introductory Nature on Aeroplanes and Aerial Locomotion.

It is perhaps almost a commonplace to say now that progress in matters aerial has been more rapid than in any other sphere of human activity. What is the very last word to-day may in six months' time be on the wane in popular favour, and in another six months will perhaps be practically obsolete or simply useful as a matter of history and as affording a valuable lesson in the direction that progress and development of the future may be expected to take.

Design in General.

In the earliest days of any type of heavier-than-air machines most of the popular examples were of the biplane type, but there were also many monoplanes, and at one time it was very doubtful which of the two would ultimately emerge triumphant. When war broke out the biplane was certainly in the majority, but the monoplane was by no means defunct, and as late as 1915 monoplanes were quite common—but how many are seen nowadays? And yet the monoplane was always the faster machine, other things being equal, and he would have been regarded as something of a freak who had prophesied that the monoplane was then enjoying the height of a brief prosperity. Questions of stability and engine power and development, however, entered into the matter, and the biplane has now entirely ousted the rival type, and may in time even have to give way to the triplane.

The Progress of Aviation.—

The question of tractor or pusher type is another that by now has been almost as definitely answered, but at one time there were as many adherents to the pusher as there were to the tractor type. And consequent upon this perfection of a type that once seemed the least likely to meet with final approval and acceptance has come another development that formerly would almost certainly have been regarded as impossible of accomplishment. The reference is to the fitting of a machine gun behind the propeller, and the synchronisation of the firing of the gun with the revolutions of the prop so that the bullets may pass through the latter without inflicting injury upon it.

Engines.

Progress in the engine world is the matter that is perhaps most likely to interest motor cyclists as such and not as incipient aviators as so many of them are. Originally engines were as low as 9 or 10 h.p., and were based primarily on motor cycle practice. Nowadays aeroplanes with a total engine power of something in the neighbourhood of 600 h.p. are quite common, and single engines yielding some 475 h.p. are also common, though not yet in use on any other than lighter-than-air machines.

Development has proceeded along certain definite and easily recognised lines. At first motor cycle power units provided the precedent; this was then replaced by a following of motor car practice, and the replacement of the air-cooled by the water-cooled engine. Nowadays there are indications that a return to air-cooled practice is on the *tapis*, but, as already stated, prophecy is a dangerous game. Also some whispers of steam engines for aeroplanes have been heard, coupled with stories of a new wonderfully light steam engine.

Besides the changes from air to water-cooling, and probably the present change back again, there have also been very considerable strides and changes in the actual shape of the engines themselves. While the first engines were of the radial type, having perhaps anything from three to seven cylinders, these have now been supplemented by rotary engines and radials with as many as twenty cylinders. Also the ordinary car shape of six-cylinder single line engine has done very good service, and has been in turn supplemented by the eight- or twelve-cylinder V twin and, later, the eighteen-cylinder broad arrow type.

All these various types have been made and used in both water and air-cooled patterns, with the single exception of the rotary engine, which, of course, is never likely to be made in a water-cooled shape. The earliest efforts consisted of air-cooled types invariably, and the later and more efficient water-cooled rival now shows signs of giving way again to the first in the field. All of which will probably have important bearing on the design of engines for both cars and cycles when these again receive the attention to which they have been accustomed. Paradoxically, progress thus appears likely to retrace its steps along its original path. Just as cycle and car engines led to the evolution of the aero engine, so the latter now seems likely to point the way for further development of the former.

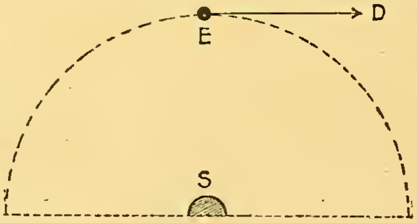
By keeping motor cyclists *au fait* with progress in the aerial world this supplement should prepare them for many interesting possibilities that may be expected in road vehicle spheres after the war—possibilities that may often on the surface appear nearly allied to impossibilities. In conclusion, this brief introduction may be ended with a note of warning—be chary of prophecy, but, if anyone feels inclined to indulge in it, be still more chary of criticism.

CORRESPONDENCE.

The Editor, although accepting no responsibility for the opinions expressed by correspondents, reserves the right to publish a portion of a letter and to omit any part which he does not consider interesting or essential. All communications under a *nom de plume* should be accompanied by the name and address of the writer.

FLYING IN A CURVED PATH.

Sir,—I was interested in "Dyne's" remark with regard to the revolution of the earth round the sun. Now, Newton's first law of motion states that a body continues in its state of rest or of uniform motion in a straight line unless it is compelled by some external force to change that state. This property of matter, in virtue of which it retains its present state of rest or of motion, unless compelled by a force to alter that state, is called inertia.



Let us consider the earth's motion; at any part the earth E is for an instant moving in the direction of the tangent ED, and because of its inertia the earth would continue to move in that direction, were it not for the gravitational pull of the sun S.

For the point under discussion we have only to deal with one force, *i.e.*, the deflecting force which alters the direction and velocity of the earth (the sun's pull), but in the dim distant past some force or forces caused the earth to have motion. It is due to the combination of the earth's motion and the sun's gravitational pull on the earth that our planet describes a curved path round the sun. If the earth's motion ceased, it would fall along ES to the sun; if the sun's attraction ceased, the earth would continue for ever along ED (unless or until acted upon by some force).

C.B.M.

FLYING FACTS AND THEORIES.

Sir,—In Mr. W. G. Aston's article on "The Influence of Altitude" (January 10th) there occur two passages which appear to me to be contradictory.

On page 30, column 1, paragraph 3, Mr. Aston says, "If the power of the engine . . . remained at all altitudes the same as on the ground . . . the speed would be increased in inverse proportion to the density."

Again, on page 31, column 1, he says, "Since resistance is proportional to the square of the aeroplane speed, multiplied by the density, it is obvious that in these conditions (constant power, irrespective of altitude) the speed of the aeroplane at various heights will be inversely proportional to the *square root* of the density."

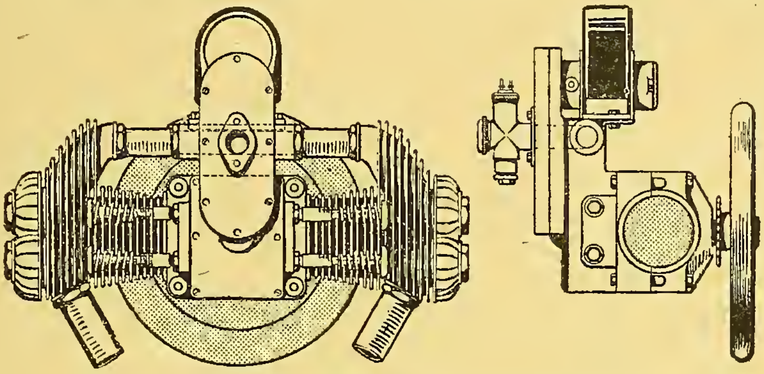
Referring to the power of the engine at various heights, Mr. Aston states that since the density at 20,000 feet is, roughly, 50% of that at ground level, the engine at 20,000 feet will give 50% of its power. Surely this is ignoring the loss in volumetric efficiency due to decreased density. If the pressure under which the charge enters the cylinder is halved it seems reasonable to suppose that the amount entering the cylinder will be halved also, so that the power will be *one-quarter* of that at ground level.

I am quite prepared to discover that Mr. Aston is right, as usual, and that I am at fault. I have derived so much benefit from Mr. Aston's articles that I hope he will see his way to enlighten me on these points. C.E.F.

A RALEIGH FOUR-SPEED FLAT TWIN?

A Probable Post-war Motor Cycle by a Famous Cycle Firm.

COMING events are forecasted in the patent files, and, while thousands of inventions are patented and then forgotten, when a large concern such s the Raleigh Cycle Co., Ltd., patents designs for at twin engines and four-speed gear boxes one may educe that this firm interested in motor ycles. There is no oubt that a motor ycle by the famous ottingham concern ill create a great eal of attention oth in the trade nd among riders enerally, and one ay say that the re-ntry of a Raleigh nto the world of otor cycles would e welcomed, especi-lly at a time when appears that several makes, more or less well known efore the war, may be absent when the peace models ome to be scheduled in a buyers' guide.

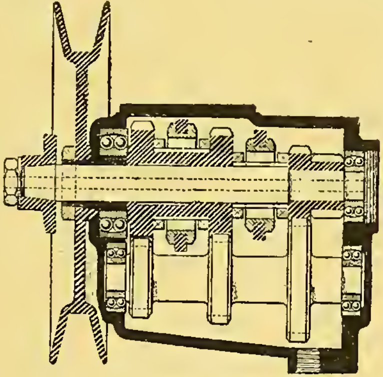

A flat twin engine recently patented by the Raleigh Cycle Co

General Engine Arrangements.

The patent specifications do not include particulars oncerning bore and stroke, nor de-ails of the complete machine, if such ave yet been decided upon. We have erely the bare outlines of the ngine. The chief point of the atent engine is the arrangement of e parts so that an open space is rovided between the crank case and e magneto platform, to allow free ccess of air to the back cylinder. he timing gear case is arranged on ne of the side faces of the crank ase, a bracket being provided to arry the magneto, which overhangs e crank case.

The drawing accompanying the pecification reveals other interesting details, but hether this illustration is intended merely to be iagrammatic is not clear. It will be seen, however, that the carburetter is shown as being fixed to a flange on the timing cover, while the centre piece of the induction pipe is presumably part of the crank case casting. This would make a very clean job of a part of the flat twin often open to improvement.

The second patent relates to a four-speed countershaft gear box, which, incidentally, does not appear to embody a clutch. The drawing in the specification, reproduced here, shows a very neat and apparently simple design. The main shaft driven by the engine carries on one end a sleeve, to which is connected the driving pulley. A layshaft carries three pinions meshing with three others, two of which are rotatably mounted on the main shaft proper and the other on the sleeve. Slidably mounted on the sleeve is a dog clutch adapted to clutch either the sleeve pinion or the adjacent shaft pinion to the sleeve. A second dog clutch is slidably mounted on the shaft, and connects either of the shaft pinions to the shaft. By manipulating these clutches four separate speeds can be obtained with very little more mechanism than that of the more conventional three-speed box.


The Raleigh four-speed gear box.

The Future.

We hope to be able to give more details of this interesting proposition at a later date. In the meantime the motor cycling world will know that if a Raleigh motor cycle fructifies it will in every way uphold the reputation the Raleigh Company has won in the pedal cycle field. It is certainly a point of interest that an entirely new model such as this will be on the lines of the flat twin and four-speeds.

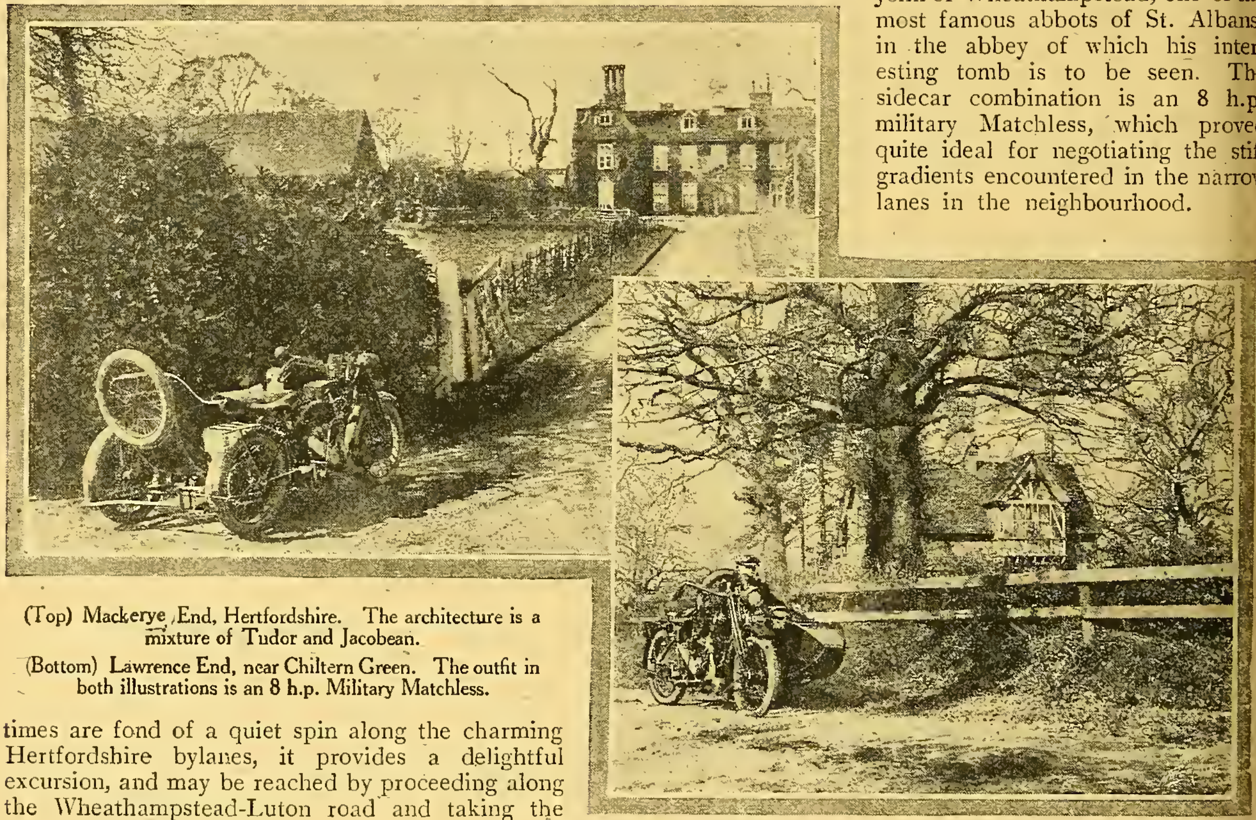
CONTROLS AND ONE-ARMED DRIVERS.

THE designing of a control system for a motor bicycle intended for one-armed drivers presents no difficulties at all, and the problem rather oncerns the actual management of the machine, until he remaining arm develops extra strength and exterity. The ignition can either be fixed, or ormally treated as such, if a lever is fitted. Single ever carburetters are obtainable, and are excellent. The gear can be controlled by a rocking pedal, with which clutch control can be incorporated. The main brake should be controlled by a pedal, and if separate clutch control is fitted, its pedal should be on the brake side, and be "picked up" by the brake pedal whenever the latter is operated. Personally, I should rely on one good pedal brake, and defy the law: in which case a hand exhaust lifter could be mounted under the throttle lever. But if a hand brake is insisted on, I should fit a pedal exhaust valve lifter on the gear pedal side, and add a hand lifter on the armless side for use with the kick starter, which would be mounted on the armless side of the machine. There is much to be said for pedal valve lifters: I have often faked them up, and enjoyed using them. After the war, some firm will assuredly make a speciality of modifying standard controls to suit men who have lost a limb. "ROAD RIDER."

THE "ENDS" OF HERTFORDSHIRE.

Some Charming Houses off the Beaten Track.

MANY places in Hertfordshire are known as "Ends." There is Ayre's End, Lawrence End, Blackmore End, Ansell's End, and a score or more of others. Mackerye End is a charming old house in a quaint mixture of the Tudor and Jacobean styles, lying about a mile north-east of Batford Mill, near Harpenden. It is difficult to find by road, and so is missed by the ordinary tourist as it lies well off the beaten track. For those who in happier times are fond of a quiet spin along the charming Hertfordshire bylanes, it provides a delightful excursion, and may be reached by proceeding along the Wheathampstead-Luton road and taking the second turning to the right after leaving the latte village at the very entrance to Batford. Thereafter th motor cyclist should bear to the right, and afte ascending a steep hill and negotiating sundry shar turns a good view of the house is obtained. It i mentioned in one of the "Essays of Elia," and at th close of the fourteenth century, the house then know as Macry End, was owned by Hugh Bostok an Margaret Macry his wife, who were parents of Abbo John of Wheathampstead, one of th most famous abbots of St. Albans in the abbey of which his interesting tomb is to be seen. Th sidecar combination is an 8 h.p military Matchless, which prove quite ideal for negotiating the stif gradients encountered in the narro lanes in the neighbourhood.



(Top) Mackerye End, Hertfordshire. The architecture is a mixture of Tudor and Jacobean.

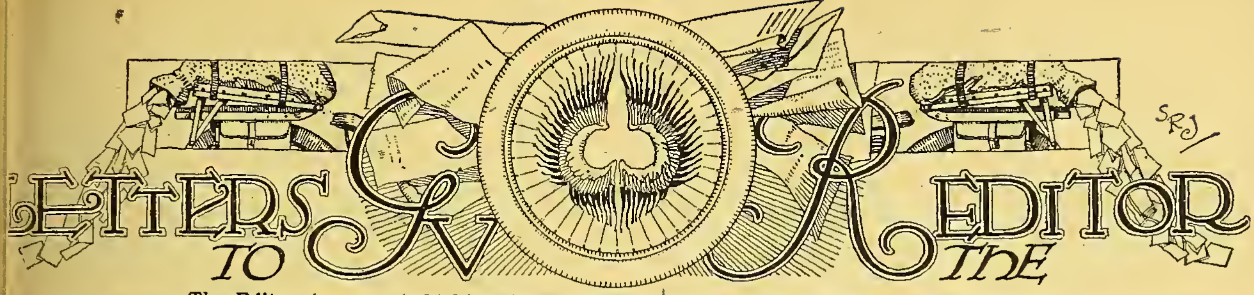
(Bottom) Lawrence End, near Chiltern Green. The outfit in both illustrations is an 8 h.p. Military Matchless.

* * *

The Motor Cycle Club of South Australia.

THE annual hill-climb of the above club was held at Sellick's Hill on January 28th. This hill is three and a half miles long with numerous sharp bends, rises 950 feet, and is thirty-four miles from Adelaide. The results, worked out on formula $\frac{W}{C \times T^2}$, were as follow:

	CLASS I.—SOLO MACHINES UP TO 300 C.C.	Fig. of merit.
1.	V. P. Elliott (Elliott-Villiers)	4,745
2.	E. Warren (Elliott-Villiers)	4,577
3.	R. V. Berriman (Triumph two-stroke)	3,446
	CLASS II.—SOLO, 300-351 C.C.	
1.	A. McKee (Kent)	4,790
2.	C. S. Lindsay (Douglas)	4,177
3.	G. A. Williams (Douglas)	3,636
	CLASS III.—SOLO, 351-600 C.C.	
1.	R. H. Abbott (Kent-Jap)	5,613
2.	P. W. Carnell (Lewis)	5,612
	CLASS IV.—SOLO OVER 600 C.C.	
1.	E. Ferguson (Indian)	4,157
2.	L. R. Buckeridge (Indian)	3,717
3.	E. C. Wagener (Blue Bell-Jap)	3,344
	CLASS V.—PASSENGER UP TO 600 C.C.	
1.	L. S. Eglinton (Kent-Jap)	6,360
2.	J. Wells (Zenith-Green)	4,377
3.	W. Courtney (Lewis)	4,329
4.	A. A. Burford (J.A.P.)	3,629
	CLASS VI.—PASSENGER OVER 600 C.C.	
1.	E. Ferguson (Indian)	3,999
2.	P. J. Coe (Indian)	2,995
3.	C. F. Cameron (Spacke de Luxe)	2,385
4.	F. Samson (Wyatt-Jap)	2,320



LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

RIVING EXAMINATIONS AND CERTIFICATES.

Sir,—Respecting the statement in the first paragraph of st week's leader, to the effect that proof of driving pacity is required, the recruit has only to ask the ecruiting Officer that he may be sent for a *trade* test. Here will be tested, and if he passes and is of the correct e and medical category will be posted as a D.R., provided at such are required. G.K.

London, W.

MPLE TYPE CARBURETTERS.

Sir,—I suppose it is a great presumption on my part—mere amateur—to venture to criticise "Chinook's" 8s. rburetter for the multitude; and no doubt, if he take y notice of this letter at all, it will be to come down on its author like a ton of bricks in your next issue. it it is my humble opinion that "the multitude" is not arly such a fool as he is sometimes considered, and in is case would much prefer to pay an extra 5s. for a cent float chamber than trust to "a fibre collar to take e hammering effect and provide a petrol-tight joint." etrol at 3s. 5½d. a gallon! W. G. ROBERTS.

RBURETTER ADJUSTMENT.

Sir,—I noticed a letter on "Carburetter Adjustment" in ur issue of March 14th. I have a 4-5 h.p. J.A.P. twin, d have had similar trouble. With a heavy sidecar I can t all the speed I want on the level and small hills with ts 000 and 3, but when I change on to the main jet, No. , while there is an increase of power, it is not in propor-on to the other jets. I can climb hills nearly as well on e first and second jets. A No. 10 jet seems to me to be ge, but it is far the most satisfactory.

I shall be pleased to see some hints in *The Motor Cycle* om some of your readers on this carburetter.

GEORGE B. AITKENS.

IE MUNITION WORKER AND HIS PETROL.

Sir,—Your impressions at a meeting of the N.M.C.F.U. ake very interesting reading.

To extend the bright idea of one of its members, why t ration the Army with munitions too? Would not that ake it easier for the tired munition workers?

As regards the question of riding for the benefit of one's alth, might I ask Mr. Torkington what he has done, or doing, to assist those who have been maimed in the ar and cannot cycle or even walk an appreciable distance? ounds rarely leave a man sound in constitution. Surely ese men are deserving of (one might almost say entitled demand) petrol to restore in some measure their shattered rves and general health—shattered, be it noted, in an deavour to protect this nation from the horrors of the un. ELREATH.

Seven Kings.

ETROL AFTER THE WAR.

Sir,—*Re* the paragraph in *The Motor Cycle* of April 4th, titled "Petrol after the War," in which it is alleged at the "Petrol Economy Officer" has stated "that *after* e war, anyone requiring petrol will be called upon to ow good cause why he (or she, presumably) should be ermitted to use it." Does this mean that the present strictions are to be continued indefinitely, and that we n no longer look forward to the time when we shall e permitted to tour, or take part in "hill-climbs" or trials"? Perhaps this "officer" contemplates the issue of a separate and distinct permit each time we wish to open our garage gates. Here is a decided opportunity for the newly formed M.U.P.A. to commence to justify its existence.

Might I humbly suggest that the "officer" in question be requested to give an explanation of the precise meaning he intended to convey by this extraordinary and disturbing statement? RAGS.

Laleham.

[It is not likely that restrictions will continue indefinitely, but, at the same time, those who expect "peace and plenty" to arrive together will doubtless be disappointed.—ED.]

BRITISH MAGNETOS.

Sir,—With reference to "Ixion's" comments on British magnetos, I should like to give a concrete example of how the British article has ousted the Hun in aero engine work.

On Rolls-Royce twelve-cylinder engines (used on Handley Page, De H4, etc.) an all-British magneto is exclusively used. Although the makers have a large stock of genuine Bosch magnetos of special design for aero work, they have discarded these in favour of the British article, which is *far lighter* and *more reliable* than the Hun machine; and, so far as I am aware, the British magneto in question was only originated during the war, and is quite unknown to motor cyclists, so it will be a pleasant surprise to post-war riders. R.P.O.

Derby.

BRITISH AND AMERICAN MACHINES.

Sir,—From time to time in your interesting paper that I receive each week I notice letters under "Overseas Correspondence" and also "Letters to the Editor" cracking up American machines. Well, if these people are Americans, well and good. Let them stick up for their machines every time by all means.

I am on active service, and have just completed two years' service on a British machine. Some of us who have stuck it right through have ridden from one end of East Africa to the other, *i.e.*, north to south.

Now if any American firm can produce a standard model machine of the same h.p. that is used at present, or even higher, which will stand up to the gruelling that these machines of ours have had, I should very much like to see it. This machine is to be treated in the same way; that means scant attention and practically no spares, also no protection from the weather.

This pretty well brings us to the point, taking the British and the American machines all round: Does the American really beat us? Our manufacturers may be a bit slow it is true, but though that may be you will find that the British machine will do exactly the same work at less cost, and at the end of it will be prepared to do the same trip again right away, when, more probably than not, the other will need an overhauling. I find that our manufacturers also are always pleased to receive suggestions or criticisms, and alterations are made where they think it advisable or necessary.

A point always in our favour is that our machines are always far simpler than the American, and many a time when I have asked a friend why he does not go in for an American machine he has simply said, "Too complicated for my liking!"

Of course, I have tried both myself, and I intend standing by the British every time, and wish good luck to the British manufacturers. G. MATHIESON.

MAGNETO REPAIRS—A WARNING.

Sir,—I would like to warn your readers of what I hope is an uncommon practice. In March, 1917, I sent my 180° magneto to a firm of repairers for remagnetising, but as they told me the armature was defective (which I do not believe) I agreed to have the same rewound. After repeated attempts to get them to return my magneto, whether repaired or not, I finally received their invoice on October 12th. A day or two later I received my magneto, and a more rotten job I have never seen. The frame is about the only part of my own magneto. The armature contact breaker, etc., I would not have picked off the scrap heap, and the whole thing was falling to pieces when unpacked, and is quite useless. I wrote and told them what I thought of it and themselves. I have had no reply to this letter of complaint. I know of another magneto treated in the same way by the same firm.

Rugby. F.J.C.

CONSERVATIVE RIDERS.

Sir,—I was rather interested in what "Kicking Horse" said under this heading in your issue of 28th March. Personally I entirely agree with his remarks that certain makes are not "the only motor cycles on earth," but cannot help sympathising with the "Untravelled Scotsmen" who put their faith in P. and M.'s. Their contention was probably the same as my own, that, having found a thoroughly satisfactory machine, it is unnecessary to experiment further.

I have had three Triumphs (all pre-war models), which gave me exactly what I wanted, and shall have no hesitation in buying the 4 h.p. countershaft model when it is available after the war, having seen the work it is doing at the Front.

I think this probably represents the opinion of that large section of motor cyclists who, before the war, were seen on the road with machines of the same make year after year, and who consequently were dubbed a "Conservative Brotherhood," and evidently rather looked down upon by the "Kicking Horse" type.

I would like to add that there are few machines on the market that I have not ridden and enjoyed, but I am still

Great Yarmouth. A ONE MACHINE ENTHUSIAST.

THE CASE FOR THE LONG STROKE.

Sir,—May I ask Dr. Alex. Lindsay some questions and make a few remarks upon his article? I ride a 67 × 95 mm. twin Ariel and a 62 × 70 mm. Levis, both long strokes, so am not prejudiced against the long stroke.

Easy Starting.—Why should a short stroke Triumph 85 × 88 mm. be less easy to start than the long stroke Triumph 85 × 97 mm.? Moreover, is it? Is there an easier starter than the more-than-square 3½ h.p. Ariel 86.4×85 mm. fitted with a decompressor? Dr. Lindsay says, "Next to the horizontal twin" the long stroke is the easier to start, admitting the superiority of the horizontal twin in this respect, yet most horizontal twins are "square" engines. Therefore easy starting is not dependent upon the stroke-bore ratio, and the point remains unproved.

Cool Running and Economy of Fuel and Oil.—Granted; but is this due to the long stroke or good design? In other words, is a long strong engine *necessarily* cool running and economical? Personally, I do not think so; but I think that a long stroke lends itself more easily to these ideals.

Speed and Power.—The *first* motor cycle to cover sixty miles in the hour was a "square" 85 × 88 mm. Rudge. Although this has since been beaten by the long strokes, it stood for some time.

The utilisation of the "expansile push of the burning mixture to the fullest extent" naturally spells efficiency, but the expansion is determined by the ratio of compression (approximately) and not by the stroke-bore ratio.

Engine Wear.—I would like to wager that if Mr. Norton would produce a "square" engine of equal capacity to his "long" one, and make the bearing pressures per square inch of bearing equal, there would be next to nothing to choose between the two for bearing wear, although the revolutions might be slightly higher. This would necessitate slightly larger bearings and compensate for the increased pressure on the piston.

Mr. Lindsay's last remarks upon speed and power are irrefutable, and form a powerful argument in favour of the long stroke. A great point overlooked by many is that, although the long stroke engine develops its power at a slower rate of revolution than the short stroke, the mean piston speed is much about the same. For instance, a 70 × 64 mm. A.B.C. geared 6 to 1 will produce the same piston speed as a 79 × 100 mm. Norton geared 3.84 to 1, road speed and wheel diameter being equal.

For quick comparison, the stroke-bore ratio of some of the engines mentioned in Mr. Lindsay's article are given:

3½ h.p. James ...	64 × 77 mm.	stroke-bore	= 1.20
3½ h.p. Norton ...	79 ×100 mm.	,,	= 1.26
Big 4 h.p. Norton	82 ×120 mm.	,,	= 1.46
3½ h.p. Triumph...	85 × 88 mm.	,,	= 1.03
4 h.p. Triumph ...	85 × 97 mm.	,,	= 1.14
4 h.p. J.A.P. ...	85½ × 85 mm.	,,	= 1.00
5-6 h.p. King-Dick	67 × 95 mm.	,,	= 1.41

Erith. T.S.

HOW MANY GEARS?

Sir,—"Lieut. (Retired)" does not state how many types of gears he has ridden. The type of gear has everything to do with the number of gears required. Now the Enfield two-speed gear and the P.M., which are of the expanding type, are very good—in fact, the only type which does not call for a third speed. They are the best all-round gears on the market in this class, with the advantage of having clutch and gear all in one. Now if a gear box is fitted, three speeds are necessary, as the gear ratio generally in a two-speed gear box is too big a jump from low to high. Say, for instance, when rounding a corner and then having to go up a gradient, or if you get stopped on a hill, this is where the middle speed comes in. Four speeds are not necessary. H. A. TOMBLIN.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—May I call your attention to the injustice to motor cyclists which is to be brought about by the new Air Force regulations?

As stated in your issue of March 21st, a motor cyclist becomes a non-technical man, whilst a petrol or steam car driver remains technical at considerably advantageous rates of pay, viz., a second-class M.T. driver receives 1s. 4d. a day more than a first-class motor cyclist, and has still the chance of 1s. more pay on promotion to first class.

Surely thousands of your readers who have enlisted through the medium of your paper will feel this a cruel injustice, having for the most part owned machines previous to the war, whilst many M.T. drivers have been taught to drive at the Government's expense in a comparatively short period.

I appeal to *The Motor Cycle* to take up the cudgels.

Farnborough. A SUFFERER.

A shell-damaged mosque in Palestine used by the Turks as an ammunition dump.

FRONT WHEEL BRAKES.

Sir,—Like F. R. Royston, I have often wondered why there are so few really efficient front wheel brakes fitted to machines. Even on a first-class motor cycle a bad front wheel brake is often to be found. For instance, on my own mount (a well-known make) there is fitted a rim brake, cycle fashion, which has proved to be useless. Not that I have often had occasion to use it. When I first bought the machine new, the brake was set so that it did not come within half an inch of the rim, and even after careful adjustment it barely touched the rim, much less stopped the machine in emergencies. Also on heavier sidecar combinations poor front brakes are found.

Is this not a question which needs more attention both by manufacturers and designers? R. J. HUTCHISON.

A SPORTING CHALLENGE.

Sir,—When I accepted Mr. S. A. Marks's challenge to run any 85½×85 J.A.P.-engined motor cycle I was under the impression that he wished to run under similar conditions to those under which the Triumph and Excelsior ran, and am surprised to see he wishes to run on Brooklands. I do not think it is fair to expect me to get my machine to London and run him on the track, as this would involve too much expense.

May I suggest that he meet me half-way between London and Cardiff, and let *The Motor Cycle* select the course up to thirty miles, which, I think, is long enough to decide which is the better engine?

I quite agree with Mr. S. A. Marks that both machines should weigh the same; my machine scales 4½ cwt. with sidecar. A.C.

Cardiff.

SECOND-HAND MACHINES.

Sir,—Thanks for the timely hints contained in a recent issue concerning the buying and selling of second-hand motor cycles. I advertised a short time ago in your columns for a Douglas model W. I received thirty-two replies. I selected about a dozen whose machines, from the descriptions given, seemed to be of sufficiently late date to be suitable, and I wrote asking for the numbers of the engines.

One would-be seller only replied to my letter, from which it would seem that the remaining eleven had given me dates and descriptions that would not bear investigation.

Another point disclosed was the exceedingly high average price that was asked for the machines, and this notwithstanding the petrol famine.

May I ask if some of your readers will give the results of their experiences with the Humber flat twin? C.

Aldeburgh.

A POST-WAR IDEAL.

Sir,—I have been reading *The Motor Cycle* with great interest lately, especially as regards the future motor cycle. The V twin has undoubtedly done marvellous things in the past, but I think the majority of riders of that type would soon discard it were a better engine from an all-round standpoint put on the market. For heavy and fast sidecar work I do not think the flat twin is good enough. Of course, we do not know the plans of our premier makers, but I *do* wish such firms as the A.J.S., Matchless, Sunbeam, etc., would turn their attention to the four-cylinder for sidecar work. A really good English-designed, four-cylindered, four-speed, shaft-driven machine would command a big market. It should be sprung front and rear, and have detachable wheels, and be well protected from mud (engine as well, *à la* Scott). But what about the price? I see sidecar outfits are being offered at £120 new, and without dynamo lighting. One could get a light car almost for that. Such a price will kill the trade.

B.E.F. F. JOHNS (Sapper, R.E.)

Sir,—I have been very interested in the articles and letters describing the "ideal machine" from the points of view of various riders, and submit my ideal from the point of view of what I may describe as the sporting tourist, i.e., a solo rider who likes to maintain a high average over a long run, and for whom power has the greatest possible fascination.

I find the most wearying feature of a long run at speed is the great clatter set up by the average medium power machine at anything over 30 m.p.h. Engine and transmission are both in need of much improvement here, also the various detail work and accessories. As things are at present, noise seems to be inseparable from high engine revs., as, although engine balance has a great deal to do with it, the flat twin is usually a very noisy engine, in spite of its perfect balance. Therefore I am in favour of a big engine, always working well within its capacity, and capable of pulling on a high gear.

With regard to transmission, I think the ratios provided by the average three-speed box are unsuitable for solo use. Generally speaking, the drop from gear to gear is too big by far.

In view of these considerations, my ideal would be as follows:

Engine.—750 c.c., 90° twin, enclosed valves, inlet overhead.

Transmission.—Zenith-Gradua countershaft with silent chain in oil bath to countershaft.

Frame.—Duplex, this being the only type suitable to accommodate the 90° twin comfortably. (By the way, I notice that "Wharfedale" has also been struck by the excellence of this type, so I may claim expert approval here.)

Springing.—Front Druid Mark 2, rear Zenith, but a modified lighter design.

Control.—Bowden cable with twist grip handles.

Accessories.—Standardised with machine; brazed-on lugs provided for fitting where possible.

General.—The whole machine to be built as light as possible consistent with sufficient strength for use as a *high speed solo mount only.*

I have satisfied myself, by means of sketches, that a very nice lay-out can be produced on these lines. S.C.C.

Penge.

Sir,—With regard to "Ideal Machines," if anyone wants a thoroughly simple, efficient, and reliable machine, only two speeds, and lightness, I think he will find the 2¾ h.p. Calthorpe-Jap fill his requirements. Although I never rode the old 2¾ h.p. De Dion, I should imagine that the J.A.P. engine is about as flexible as any. The Calthorpe is simple, as it has two speeds and clutch combined in the Enfield gear. There are no gear teeth to strip, and the gear will stand any amount of ill usage. It is light and reliable, and quite fast, capable of about 46-48 m.p.h. without any tuning. When fitted with the Amac semi-automatic carburetter it is very simple to drive, the throttle being the only lever to manipulate, once the air is opened. The frame is also well designed, having a straight top tube, which makes for strength.

May I add the usual disclaimer? CADET.

Dartmouth.

CARBURETTER ADJUSTMENT.

Sir,—I have had Binks three-jet carburetters on three different machines, two twins and one single, and I know and have suffered from Mr. H. A. Connell's symptoms, though I have always managed a cure. In two cases out of the three a much larger jet was the remedy, *e.g.*, my present machine (79×100 single) refuses to run on a smaller main jet than 9, and even with that there is one choking spot—no adjustment of bottom air will cure it. Except for this one spot, over which I always hurry, the engine responds in Norton fashion over the whole range of the throttle. In the other case—a 60° twin engine—the cause was more obscure. I could never open on to the main jet at all, no matter what size I put in. I tried six different sizes, and finally I discovered that the leather jet damping pad was saturated with water. Once that was dried, a No. 7 jet worked the oracle. The pad seems to have been kept permanently damp by water trickling down the throttle cable on to the top of the barrel whenever I was out in the rain.

I wonder if Mr. Connell tests the jet sizes with a fine needle; I have found the numbers decidedly unreliable. If he is using a Binks hot air elbow, has he inspected the *inside* of it? I have on occasion found the inside diameter reduced by about 50% by part of the sand of the casting being left *in situ;* consequently the fitting of the pipe caused an enormous drop in power until the elbow was cleared. Finally, is his "jet-table" petrol-tight? I had one that was not, and it was the source of endless bother.

(REV.) J. M. PHILPOTT.

A REMARKABLE TWO-STROKE ENGINE.

Develops 37 h.p. and Weighs 30 lb.

THE following is a brief description of a very remarkable two-stroke engine of marvellous power. The engine is a single-cylinder, single-acting two-stroke, with forced feeding—one cannot call it induction. The cylinder is of steel, water-cooled, circulation being on the thermo-gravity system. No separate radiator is provided, the whole of the cooling water being contained in the steel water jacket which surrounds the cylinder. In consequence of this the capacity of the water jacket is very large compared with the cylinder. Where continuous running is required an external supply of water can be arranged to replace any loss due to evaporation. The engine differs from the orthodox type in that not only does the piston move, but the cylinders also, and the reciprocation of the latter operates the whole of the timing mechanism.

Ignition is effected without either magneto or coil and battery, in spite of which starting up from cold is absolutely instantaneous, and full power is immediately available, no warming up being required, unless, of course, the cooling water is frozen, which naturally should not be allowed to happen.

In view of the terrific horse-power developed, it is not surprising that the cylinder pressure is somewhat higher than that which obtains in the ordinary motor cycle engine. The latter seldom reaches a maximum of 300 lb. per square inch. A modest pressure of about 38,000 lb. per square inch may therefore seem a trifle high. It is a hundred and twenty-seven times as much as the motor cycle maximum.

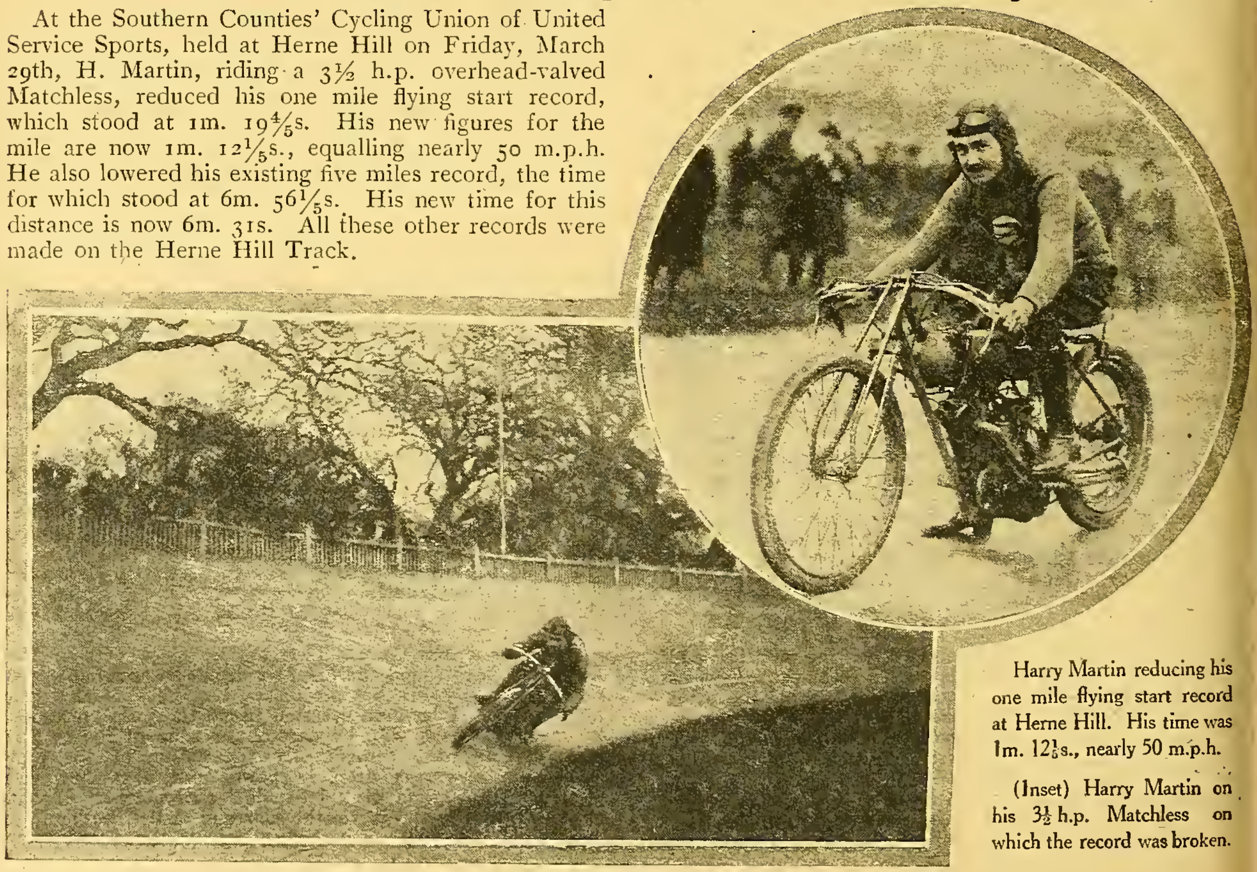
The fuel is not petrol—nor gas. It is something very special, and, although rather high in price (and at present unobtainable by the general public), there seem fortunately to be ample supplies. Carburetter? There is no carburetter to flood and leak air in where it is not wanted. There is only one thing against this engine—it is not at all flexible.

Honestly, the facts are as stated, exactly. But to drop the camouflage and display this wonderful engine. The riddle is really very simple. The cylinder is a barrel, the piston a bullet, ignition by percussion upon fulminate of mercury, and the fuel cordite. The *tout-ensemble* is called the Vickers automatic machine gun, water-cooled, and fires at the rate of 500 rounds per minute, the mechanism being operated by the recoil of the barrel. It is, in fact, a small internal combustion engine, and actually develops over 37 horse-power at 500 rounds per minute, with a bore .303in. and stroke 28in.

T.S.

Record Breaking on Good Friday.

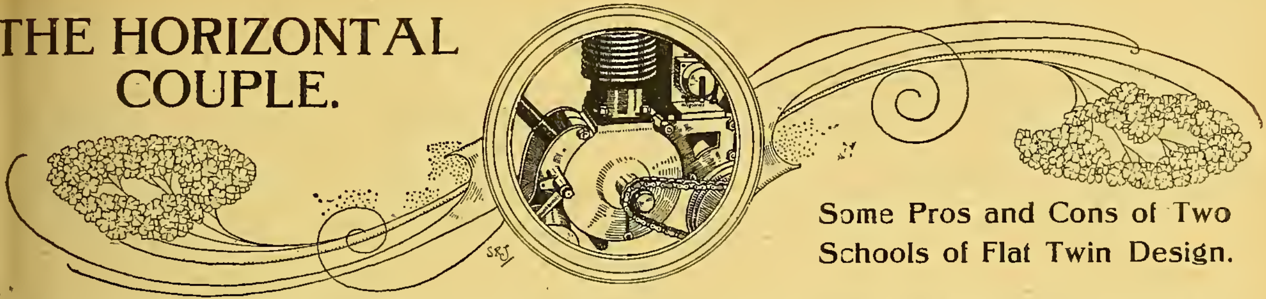
At the Southern Counties' Cycling Union of United Service Sports, held at Herne Hill on Friday, March 29th, H. Martin, riding a 3½ h.p. overhead-valved Matchless, reduced his one mile flying start record, which stood at 1m. 19⅘s. His new figures for the mile are now 1m. 12⅕s., equalling nearly 50 m.p.h. He also lowered his existing five miles record, the time for which stood at 6m. 56⅕s. His new time for this distance is now 6m. 31s. All these other records were made on the Herne Hill Track.



Harry Martin reducing his one mile flying start record at Herne Hill. His time was 1m. 12⅕s., nearly 50 m.p.h.

(Inset) Harry Martin on his 3½ h.p. Matchless on which the record was broken.

THE HORIZONTAL COUPLE.



Some Pros and Cons of Two Schools of Flat Twin Design.

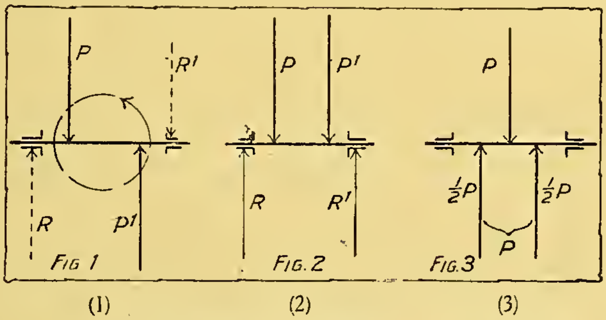
SOME time ago in criticising certain flat twin engines the writer expressed the opinion that the more frequent troubles experienced were due o the inherent unbalanced couple inseparable from he accepted design now in favour.

Since the appearance of that opinion confirmation ias been forthcoming from others who have had xperience with the horizontally opposed engine in ther fields of engineering, and it is to be anticipated hat the point will not be without its effect on the levelopment of the type.

Before passing to any practical consideration, it nay be as well to explain for the benefit of the non-echnical reader that "a couple" is the effect on a ody of the application of two equal and parallel orces, of opposite direction which cause that body o rotate about a point midway between the points of pplication of the forces.

A couple can only be balanced by two opposing orces which create a couple of equal moment and pposite turning movement.

Diagram 1 represents the crankshaft of a horizontal win engine, in which the forces applied from the ylinders are shown by the nes P and P¹, and these orces produce an anti-lockwise couple (as indiated). The reaction of e bearings R R¹ gives the ouple of equal moment nd opposite sense, which ounteracts the tendency of e crankshaft to rotate orizontally.



(Fig. 1) Representing the crankshaft of a horizontal twin engine. The forces applied from the cylinders are shown by the lines P and P¹.

(Fig. 2) Showing that in the vertical twin-cylinder no unbalanced couple exists.

(Fig. 3) A three-throw type of crankshaft in which all the forces are in balance.

The second figure shows the same diagrammatic anner a vertical twin linder, in which it will be bserved that no unbalnced couple exists, since this case P and P¹ are oth applied in the same irection. In other reects, however, the vertil four-cycle twin is not a successful type.

The effect of the unbalanced couple in the horiontal twin does not appear to the rider in the form f vibration such as that with which we are familiar rising from the compromise lack of balance of the eciprocating mass in a single-cylinder engine, but it possible that it may have more than a little to do ith a number of minor engine faults, which, curiously hough, have not shown themselves in engines free om this mechanical defect.

In order to prevent the shaft from rotating in a horizontal plane (not to be confused with that function of freely revolving upon its axis, which knutty D.R.'s so ardently desire to be fulfilled when they adorn their flywheels with the request "P.T.O.") it is very necessary that the engine case and bearings be of special stoutness and rigidity; indeed, it is quite common practice to use lighter main ball bearings in 3½-4 h.p. singles than in small flat twins.

In America, where the flat twin high power engine has been largely used for farm tractor propulsion, experience has proved the necessity for extremely sturdy bearings and housings.

Considering the fact that the moment of a couple is proportionate to the distance between the forces creating it, it becomes obvious that the narrower the bearings of the crank throws and the intervening web the smaller is the disturbing effect.

Limiting the Effect of the Couple.

The most suitable form of connecting rod and bearing to limit width is the roller big end of the Scott pattern, but its practical application to a one-piece crankshaft is not easy. The designer of the A.B.C. engine, however, has more than one method of circumventing the difficulty, and if his machine proves capable of long and reliable service in the hands of the average rider no doubt his attention to this particular feature will be one of the contributory causes of its success.

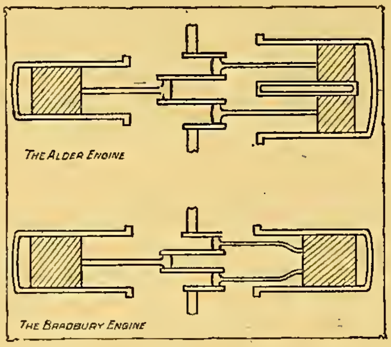
In all automobile work, where price and everyday use are of prime importance, it is often necessary to adopt a compromise rather than incur the extra expense in obtaining what may ultimately prove to be a mere theoretical advantage, and it is quite possible that the narrow, two-throw crankshaft will establish itself as the better working solution of the only mechanical objection to the horizontal twin than will the type to be reviewed hereafter. At the same time, it must not be overlooked that with the former a slight horizontal couple cannot be eliminated, though it can be reduced to very small importance, whilst in the latter perfect mechanical balance is obtained within the crankshaft itself.

The Horizontal Couple.—

Returning to the properties of couples, the existence of a couple is consequent upon the application of two parallel equal forces of opposite sense, and it cannot be balanced by a single force. Now, referring to our diagrams, if we divide one of our forces P into two halves and apply these to the shaft at two points they may be balanced by one force, the remaining undivided P^1 acting at a point midway between them. (Diagram 3.)

This arrangement gives the three-throw type of crankshaft in which all the forces are in balance.

Two designs on this principle have been brought prominently before the writer's notice. The first, the patent of Mr. Alder, employs two pistons and rods, with a common combustion head opposed to one large cylinder; whilst the second, the 3½ h.p. Bradbury, has two equal cylinders with one forked and one single connecting rod.



Two designs of engines in which all the forces are in balance.

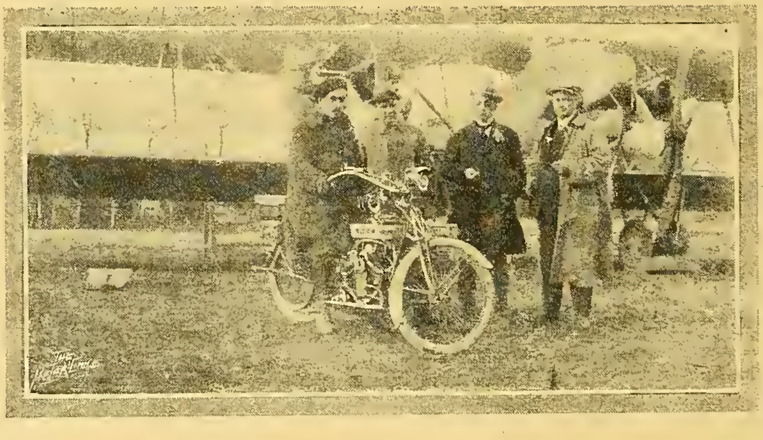
Manufacturing Difficulties.

The manufacture of neither of these engines would be as easy nor as cheap as of those of the two-throw type, although the Bradbury design seems to offer least difficulty, since it merely calls for the balancing of the weights of the two connecting rods, whereas the Alder engine not only has the problem of balancing two rods and pistons against one, but has the even greater difficulty of adjusting the volume of the common combustion head of the double-bored cylinder to equal that of the single-cylinder and to obtain the same compression ratio. From the works standpoint also the unsymmetrical cylinders would necessitate a double number of patterns and a double stock of parts; while, speaking from a fairly large experience of cylinder and crank case boring, machine shop costs alone would more than turn the scale in favour of the Bradbury design. The conventional appearance and external symmetry of the latter are also features not to be ignored, especially so since nothing is sacrificed to obtain them.

The writer certainly favours the three-throw crankshaft, despite the fact that it is so seldom used, and it remains to be seen, with the advent *(après la guerre)* of more firms into the flat twin arena, whether this type will come more to the fore, as it certainly deserves to come. Possibly we shall be compelled to await a decision on finality in flat twin design until an entry into the lists of something that everyone will want to buy. WHARFEDALE.

4 h.p. Douglas for French Despatch Riders.

THE principals of the Douglas factory have just returned from an interesting journey in France. Taking with them two of their well-known 4 h.p. sidecar outfits for trial by the French military authorities, they carried through a successful week's test, and the machines were left behind to undergo further hard work at the hands of the French inspectors. If the result is satisfactory, and there can be little doubt on that point, it will probably lead to a regular supply of machines for the use of French D.R.'s who at present handle a very mixed lot of motor cycles.

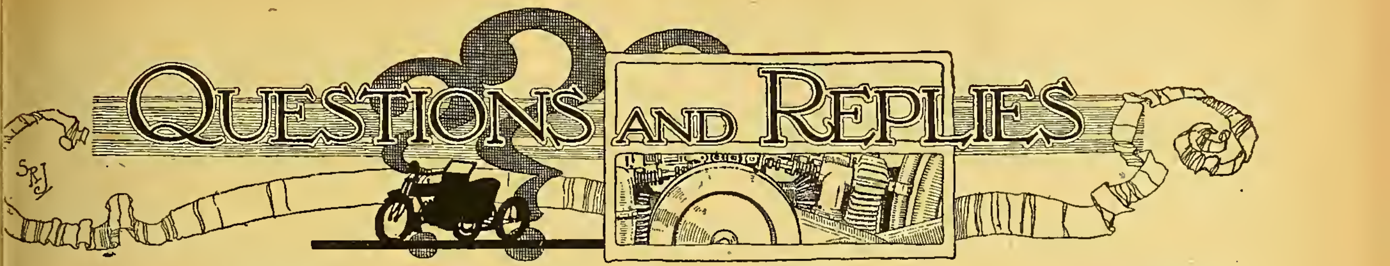


A group of Douglas representatives in France. Reading from left: M. Letroid, maker of the famous bombing aeroplane bearing his name; W. A. Davis, of the Paris Douglas depôt; Mr. S. L. Bailey; and Mr. W. W. Douglas.

During the trip, Messrs. W. W. Douglas and S. L. Bailey had the privilege of a lengthy flight in one of the large twin-engined Letroid bombing planes over the war zone. M. Letroid, the designer of this fine plane, is chatting with Messrs. Douglas and Bailey in our illustration. The plane embodies many striking departures which it is not desirable to describe.

It is also interesting to note that Messrs. Douglas and Bailey were staying in Paris when the unfortunate explosion at a grenade depot occurred, and give a striking description of its startling nature.

At the request of the Association of British Motor and Allied Manufacturers, Dr. Addison, Minister of Reconstruction, has nominated Mr. H. C. B. Underdown to serve upon the Engineering Trades (New Industries) Committee, and has authorised the formation of a Branch Committee for the Motor Industry, which has been formed as follows: Mr. Bernard Caillard (vice-chairman) (director of Wolseley Motors and managing director of the British Lighting and Ignition Co., Ltd.), Mr. Edward Powell (president of the S.M.M.T.), Mr. J. B. Stocks (general manager of Components), and Mr. Horace Wyatt (secretary).



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

›ic Capacity and Horse-power Formulæ.

? Would you explain how to calculate the cubic capacity of an engine? Also the horse-power, when given the bore and stroke?—ENQUIRER.

e cubic capacity is obtained by means the following formula: $D^2 \times S \times .7854$, ere D = bore of cylinder and S = oke in centimetres. The answer will in cubic centimetres. To find the se-power, perhaps the most accurate thód would be Hospitalier's formula, ich is as follows: Square the radius the piston in centimetres, multiply by stroke in centimetres, multiply by number of revolutions per minute, ide by 1,000 and again by 75; 75 ogrammetres per min. equal 1 h.p. ench). The formula may be written efly as follows:

$$\frac{\times S \times N \times \text{revs.}}{75{,}000} \quad (N = \text{No. of cylinders}).$$

Choice of a Machine, etc.

? (1.) What type and make of motor cycle would you recommend me to get for a fairly hilly locality? My weight is 10 st. 4 lb. (2.) I am engaged in war work on he land as supervisor of a cow-testing ssociation, and have to visit the mem-ers who reside in various districts from ne to fifteen miles apart in connection ith their work. In order to do so I eed a motor cycle this year. What ourse should I adopt to procure one? .) Can I get a petrol permit, and ow? (4.) This work is under the epartment of Agriculture, by whom I m partly paid. One of the local ustices of the Peace is president of his association, and can testify to my eeds.—DUBLIN.

Any modern lightweight should satisfy ur requirements, the actual make de-ding upon personal preference and amount you are willing to spend. (2.) you require a new machine you should ly to the Priority Branch of the istry of Munitions for a class "A" ificate, which will be necessary before can purchase a new machine. If, vever, you require a second-hand chine, and such a machine should be te satisfactory if carefully chosen and too old, you may obtain one from dealer with a good reputation or ough the small advertisement columns *The Motor Cycle.* (3.) You should ly to the Petrol Controller, 19, Berke- Street, London, W.1. (4.) The evi-ce of the Department of Agriculture y be necessary, but the Petrol Con-ller will inform you if this is so.

Gear Ratios.

? Hearing that a friend of mine has left me a 2½ h.p. 1916 Calthorpe-Jap fitted with an Enfield two-speed gear, I should be glad if you would let me know: (1.) The two gear ratios. (2.) What gradient it could climb; I weigh 12 stone. (3.) What speed I could average on short runs. (4.) Would it be suitable for short tours?—J.D.W. (R.A.)

(1.) The top gear is 5½ to 1 and the bottom gear 10-12 to 1. (2.) About 1 in 6. (3.) It would average on tour about 20 m.p.h., with a maximum of 35 m.p.h. (4.) It would be suitable for tours.

"THE MOTOR CYCLE" AND THE PAPER SUPPLY.

THE NEED FOR ECONOMY.

Owing to the present drastic restrictions on the import of paper, the most rigid economy is necessary, and it is important that no copies of this journal shall be wasted.

Every reader is requested, therefore, to assist the publishers in effecting the necessary economy by placing a definite order with a newsagent for a copy of "The Motor Cycle" to be reserved or delivered regularly each week, thus avoiding chance buying, which may lead to wastage owing to copies being left unsold.

Magneto Condenser Trouble.

? I have a 2¾ h.p. Moto Rêve motor cycle, and have discovered that the magneto has something wrong with it, as the wax that keeps the contents of the condenser in position has begun to melt and find its way on to the pole pieces. I discovered that a spark occurred at the platinum points when running, and I was also troubled with hard starting and very faulty running and erratic missing. Do you think that the trouble is a faulty condenser shorting owing to the wax melting? Could I test for a short by connecting up the condenser to an accumulator and voltmeter?—A.J.C.

We are afraid that the the test you suggest would not be at all a conclusive one. If the connections render it possible it would only prove that the condenser was faulty, which already appears to be the case owing to the extra sparking at the contacts. The only course that we can safely recommend is that you send the magneto complete to a magneto repairing specialist. The repair should not be an expensive one if you placed it in the hands of a satisfactory firm.

Unequal Firing.

? (1.) I own a 5 h.p. V twin, and have considerable difficulty in getting both cylinders to fire with equal regularity, apparently by reason of one cylinder drawing a different strength of charge from the other. I have spent much time in checking the magneto and valve timings, etc., and am led to conclude that the unequal periods between the successive suction strokes of each cylinder cause the velocity of the gases to have a "banking up" effect on one cylinder more than the other, and thus to enrich this side at the other's expense. I should be pleased to know whether you think there is anything in my theory or not. If so, one would naturally suppose that a carburetter for each cylinder would overcome this difficulty. (2.) Also, in order to follow this trouble further, I propose fitting two separate exhaust pipes—one on each side of the machine—so as to be better able to trace the cylinder which fires unevenly, and this possibly could be located by listening for the offending side whilst riding. Now, would the separation of these pipes cause any appreciable drop in efficiency? It appears to me that it would, by reason of the mutual help the velocity of the exhaust gases in the single pipe have upon each other. Also for two outlets I should imagine there would be considerably more resistance offered by the atmosphere.—H.T.D.

(1.) The trouble of which you complain is not an uncommon one in the case of a V twin engine. The difference in power between the two cylinders may be due to unequal compression, unequal strength of the valve springs, air leakage at joints, or possibly incorrect tappet adjustment. (2.) Your idea as regards two separate exhaust pipes is a good one, because there will then be no trouble of one exhaust interfering with the other, and, of course, you will be able to check more easily which cylinder is firing weakly, and the fact of fitting two separate exhaust pipes might tend towards greater efficiency. It is absolutely desirable that the exhaust from each cylinder should have perfectly free egress and should not be obstructed.

Joining the R.A.F.

I have been a motor cyclist for the past five years, and have a thorough knowledge of motor cycles and a fair knowledge of motor cars. Would you kindly let me know if there are still vacancies for motor cyclists in the R.A.F.? If so, kindly send me further particulars and where to apply for enrolment.—W.O.

You should apply to your local recruiting officer, unless you are a conscript, in which case we doubt if you will be allowed any choice of regiment or unit.

R.A.F. Cadet's Kit Allowance.

Could you tell me at what stage in his course, allowance is granted for the provision of outfit to a cadet in the R.A.F.? I take it that this would occur on his becoming a flight cadet after leaving School of Armament, but as you appear to be very well posted in these particulars I think perhaps you will not mind passing on any information to interested readers.—W.R.W.

A cadet to the new R.A.F. is granted uniform on joining as a cadet, and kit allowance on being gazetted, as usual. The expense of the uniform is deducted from the kit allowance.

Mysterious Two-stroke Trouble.

I ride a two-stroke, and shall esteem it a favour if you can help me out of the following difficulty. I have taken it to two or three different repairers, but they do not seem able to do much good. It runs well for quite a long time, and starts at the first pull round of the back wheel, and then it takes a fit and cannot be made to start under any circumstances. It recently ran well for about twelve miles, when I had to make a stop. On trying to restart I could not get it to go for some time, when it ran irregularly for two or three miles, and then suddenly stopped with a big splutter. Everything seems to be in perfect condition—plug clean, no leaks at joints, compression good, jet clear, no air lock, good big spark, plenty of petrol, timing correct, silencer not choked, and platinum points all right. Everything seems to be as it should be, but the engine will not start. I took it to a garage, and the owner tried all the afternoon, but could not get it to start, and I have now left it for a general clean up. My crank case has not a drain pipe. If oil and dirt collected there, would that prevent the machine from starting? I asked the man with whom I left the machine to fit a drain plug, but he says he is unable to do so, as the crank case is made of aluminium and is too thin, and that the hole would get larger. Is this correct?—F.J.C.W.

Diagnosis of your trouble is certainly rather difficult. Are you quite sure that the principal ports are quite clear, and that none of the passages in the induction and exhaust system is choked up? Also, the petrol feed system should be carefully checked. If the feed of petrol is temporarily interrupted, your difficulty, of course, would be fully explained. We have heard of similar cases being entirely due to an air lock in the petrol tank of a purely temporary nature, and consequently difficult to determine. A vapour lock in the petrol pipe, if this is too close to the exhaust pipe or cylinder, would have the same effect. Another cause of the trouble might be due to the magneto. When the engine stops, have you ever tried putting your thickly gloved hand on the sparking plug terminal before the machine has entirely lost way? If you feel no shock, this would rather point to the probability that the magneto had temporarily ceased to spark, whilst after a short rest it may be quite correct again. Also you should search carefully for air leaks at the cylinder joints, induction system, and crank case joints. If, of course, you have an unsuitable plug, it is possible that this may be the cause of your trouble, although it is very unusual indeed that a plug will cause an engine to refuse to start soon after it has been running satisfactorily. We do not think that the absence of a drain plug in the crank case has anything to do with the trouble; but there is no doubt that such a plug would be a very useful fitting. The repairer's trouble is caused by the absence of a boss on the crank case in which to screw the plug, but it should be possible to screw or rivet on a loose boss.

Use of Petrol for Health Riding.

My principal reason for taking up motoring was because my wife was an invalid, and her only possible chance of getting out was by having something brought to the door to take her. I bought a motor cycle and sidecar, and my wife and I have had some pleasant outings. Unfortunately my wife is not any better, and, so far as I know, has no prospects of going out this year. If you can kindly inform me whether I am actually barred from the use of petrol, under the circumstances, you will extremely oblige.—T.G.

You cannot legally take out your wife in the sidecar unless you can obtain a doctor's certificate to say that such journeys are necessary for her health. Even then you would not be strictly covered in the eyes of the law; but it is possible that such a certificate would induce a bench of magistrates to adopt a lenient view of the case were action taken.

Removing a Crank Case Ball Race.

My motor bicycle is a tw speed, chain-driven, 1913 mo 3½ h.p. B.S.A. I have a n crank case ball race, which want to fix in the crank ca but I cannot do so, as I am unable get the old ball race out. Please me know what tool I require, a how to get the old ball race out of t crank case.—W.J.S.

The makers of your machine recomme the following method, but other ma facturers prefer to use a screw-pre To remove the ball bearing now in t crank case, the crank case half should held in the gas flame, so that the h will expand the aluminium and allow t ball race to drop out, but care sho be taken to see that the heat is sufficient to interfere with the temper the ball race. If the crank case is ca fully watched while it is heated in manner suggested, the ball race w probably drop out of its own accord, matters can be assisted if the ball r is given a few sharp taps after t crank case has been in the flame for short time. When the old ball race been extracted in this way, the new should be inserted immediately, bef the crank case is allowed to cool.

RECOMMENDED ROUTES.

LLANDRINDOD WELLS TO MANCHESTER W.W.

Llandrindod Wells, Rhayader, Llan loes, Newtown, Welshpool, Oswest Wrexham, Chester, Northwich, M chester.

ALDERLEY EDGE TO NEW RADNOR.—E.

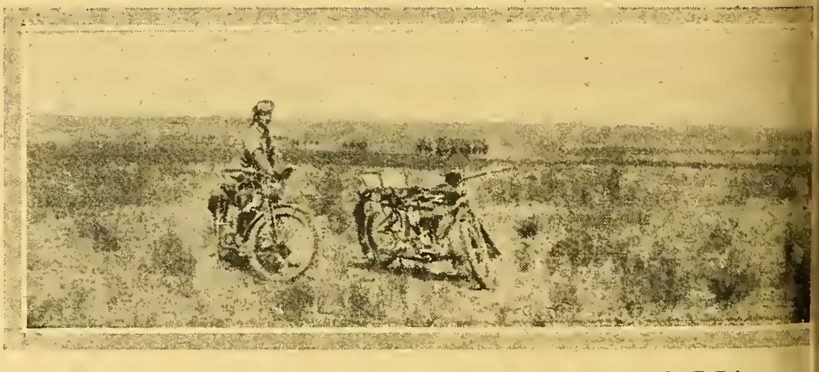
Alderley Edge, Congleton, Cre Nantwich, Whitchurch, Shrewsbu Bishop's Castle, Clun, Knighton, N Radnor.

BRIGHTON TO MIDDLEWICH.—F.R.

Brighton, Henfield, Horsham, Gui ford, Farnham, Odiham, Reading, ford, Banbury, Coventry, Lichfie Stone, Newcastle, Middlewich.

LEICESTER TO YARMOUTH.—W.P.

Leicester, Uppingham, Stamfo Market Deeping, Spalding, Holbea King's Lynn, Swaffham, Norwich, Y mouth.



Despatch riders in the Holy Land. These vast expanses are traversed by D.R.'s, great distances being covered on second gear. Needless to say, the gear boxes occasionally give out in consequence of such severe gruelling.

You know what a new cover costs

—a Beldam Retread costs from 15/6. Most Beldam Retreads are good for 5,000 miles. . . The moral is obvious! Send old cover (any make) to us before it is too far gone, and we will quote cost of retread or repairs. A retread in time saves much money. Booklet "Testimony"—post free—gives experiences of users of Beldam Tyres and Retreads. They know!

The BELDAM TYRE CO., LTD.,
Brentford——Middlesex.

Beldam Retreads

odbolds

When halcyon days return, DON'T FORGET the reliability of the

HOBART

MOTOR BICYCLE

is the result of 15 years' manufacturing and riding experience, and make a point of securing early delivery of one of these handsome, handy, and reliable machines.

HOBART BIRD & CO., LTD.,
Hobart Works, Coventry, England.

Established 1834.

Telegrams:
"Hobart, Coventry."

Never Trouble Trouble till Trouble Troubles you — *BUT* — *when Trouble does Trouble you, turn to*

TRACING TROUBLES

MOTOR CYCLE FAULTS, THEIR IDENTIFICATION AND THEIR REMEDIES, SIMPLY AND FULLY EXPLAINED.

Third Edition

(Revised).

In this edition considerable changes have been made, all obsolete matter has been taken out and new material has been added to bring it up to date.

The section which deals with the two-stroke type of motor cycle has been enlarged and re-arranged in view of the vastly increased number of two-stroke engines now in use.

A new section dealing with electric lighting dynamos as applied to motor cycles has been added.

The Book that helps Motor Cyclists out of their Troubles.

¶ All motor cycle riders, and especially those using their machines for vital work, should keep a copy of this little volume handy. It will help them out of many a difficulty.

¶ Not only does it show how to locate a fault quickly, but also provides a remedy for it when it has been found. All conceivable motor cycle failures are dealt with by the author.

Price, 1/- net. By Post (Home or Abroad), 1/2

From ILIFFE & SONS LTD., 20, TUDOR STREET, LONDON, E.C.4,
and all leading booksellers and bookstalls.

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns —First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller. but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

Abingdon.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1914 T.T. 4h.p. Abingdon King Dick, fast engine; 28 gns. [4400

A.J.S.

A.J.S., 1915, 6h.p., quick detachable wheels, fine sidecar; 68 gns.—Farrar.

A.J.S. 1915 6h.p. Combination, spare wheel, Lucas lamp set, very fine combination; 78 gns.—Farrar.

A.J.S. 1916 6h.p. Combination, spare wheel, electric lights, 1,300 miles only; 84 gns.—Farrar's Motors, Hopwood Lane, Halifax. [4337

A.J.S Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

A.J.S., 1914, 6h.p., and coach sidecar, nice condition; £68/10.—Motor Exchange, Horton St., Halifax. [4481

1915 A.J.S. Combination, 4h.p., 3-speed, kick start, with all accessories,. nearly new.—Pickering, Shrewsbury. [X3051

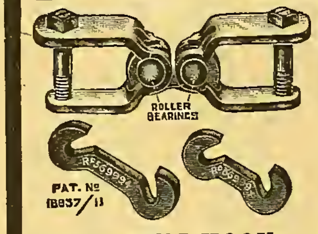
1918 A.J.S. Combination, Military Model, run only 20 miles, Lucas accessories; £115.—Box 1,834. c/o *The Motor Cycle.* [X3349

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1915 A.J.S. 2¾h.p. lightweight. 42 gns.; 1916 A.J.S. De Luxe combination, spare wheel, hood, screen, 95 gns. [4382

Making two ends meet—

is a function performed successfully, all the time, by "the fasteners that never fail" — the

FORWARD



The KING HOOK.

Detachable 1/-. Adjustable 1/3

They hold the ends of the belt together under all conditions, and their roller bearings and exceptionally strong steel links ensure a service quite superior.

They are, in short, a detail which will enhance the efficiency of your machine materially.

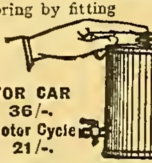
Why not test them?

FORWARD MOTOR CO.,
Forward Works, Summer Row,
BIRMINGHAM.

t152

GET PLEASURE IN FULL MEASURE
Out of your motoring by fitting

THE EUK EASY STARTER



FOR CAR 36/-.
Motor Cycle 21/-.

Fitted in 10 minutes. Operated by a touch. Eliminates all starting difficulties, and gives instant perfect easy starting. Never fails. Over 33,000 in satisfactory use. Details free from—

ALEXANDER & CO., Dept. B, 115, Lothian Road, EDINBURGH; 274, Gt. Western Road, GLASGOW.

DEFENCE OF THE REALM AC

Under the provisions of the above A advertisers requiring workmen, and who business consists wholly or mainly engineering or the productions of munitio of war, or substances required for the pr duction thereof, and whose works a situated within 30 miles of London, mu include in every such advertisement t words, "No person resident more than miles away, or already engaged on Gover ment work, will be engaged."

Advertisers whose works are situat more than 30 miles from London can or have their announcements inserted wi the approval of the Board of Trade, w will allocate to each advertisement a b number, and collect and distribute to t advertiser all replies received. The nece sary forms of application can be obtain from any Labour Exchange or from t offices of this paper, and each adverti ment must contain a clear reference to t effect that no person already engaged Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S., 1917, 6h.p. 3-speed, special War Model with 700×80 tyres; £92.—Exeter Motor Cy Ltd., Bath Rd., Exeter.

A.J.S., 6h.p., latest Service Models, detachable 700×80 tyres: £91/6; immediate del Pepper's Garage, Shelton, Stoke-on-Trent.

1916 6h.p. A.J.S. Combination, only done lamp, horn, and Cowey, not been used months, perfect; £85.—Wilderspin, Chatteris.

A.J.S. 1916 Combination, 6h.p., splendid outfit, cessories, spare wheel, hood, screen, etc., £ 2¾h.p., 2-speed, £34; E.P. or exchange.—Servi 292, High Holborn, London.

A.J.S., late 1917, 6h.p., and coach sidecar, nu accessories, 3 lamps, in absolutely new co 700×80 tyres (unpunctured); £95, or part e 2¾h.p. same make.—Box 1,840, c/o *The Motor*

A.J.S. Motor Cycles.—Immediate delivery of model, complete, detachable wheels, 700×80 £91/6; trade supplied; no permits required.- Evans, sole agent for Birmingham and district, John Bright St., Birmingham.

1916 4h.p. A.J.S., No. 8,070, complete lamp sets, mechanical horn, Cowey speed pump, set of tools, including spare wheel, but car, approximate mileage 3,000, in perfect co £75.—Robinson's Garage, Green St., Cambridge.

A.J.S., 6h.p., and sidecar, with wind screen, la horn; this is one of the latest 1915 models out, as it left the works in October, 1915. Th has been thoroughly overhauled and revarnish is practically equal to new in every possible price only 75 gns.—Julian, 84, Broad St., Biggest light car and motor cycle dealer in the 'Phone: 1024. Closed Wednesdays 1 o'clock.

Alldays.

ALLON, new 2¾h.p., 2-speed; £46/10.—Pi Mardol, Shrewsbury.

RIDER TROWARD and Co., 31 and 40b, H Hampstead.—1916 Alldays Allon, 2-spee order; 26 gns.

ALLON, 1915, 2-stroke, 2-speed, Stewart me horn, Millers lamp; a bargain, £22.— Northall Villa, Penhale Rd., Eastbourne.

ALLON, 2¾h.p., single, £38, new; 2-speed, £4 2-speed and hand clutch, £48, new; £28/10; E.P., or exchange.—Service Co., 292 Holborn, London.

PRACTICALLY New 1917 2¾h.p. Alldays stroke, 2 speeds, lamp, horn, tools; £35, with Hargas outfit £40; genuine bargain.—11 ville St., Burnley.

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., countershaft models in stock.

Auto-Wheels.

GENUINE Wall Auto-Wheel, complete, litt splendid condition; £8/10.—Murray's, 37a, St., Hatton Garden, Holborn.

Bat.

6h.p. Bat-Jap, Bosch, good order; £14.—16, Rd., Tottenham.

1914 Bat-Jap and Sidecar, 2-speed, free eng starter; sacrifice £35, or nearest.—68, Rd., Cwmcarn, Newport, Mon.

OTOR CYCLES FOR SALE.

Bown.

TROWARD and Co.—1917 Bowns 2-stroke, m engine, mileage 500, as new, 19 gns.—31, 78, High St., Hampstead. [4386

Bradbury.

TROWARD and Co., 31, 40b, and 78, High Hampstead.—1913 Bradbury, 4h.p., 2-speed, ood condition; 19 gns. [4384

BURY, 1912-13, 3½h.p., 3 speeds, with coach lecar, £32/10; 1913 3½h.p., 3-speed model, Motor Exchange, Horton St., Halifax. [4482

Brough.

GH, 3½h.p., Sturmey-Archer 3-speed, h.b.c. h, little used, perfect condition; £55.—Lawrev, a Club, Deal. [X3414

B.S.A.

1916 Combination, in real good order; £58.— w.

1916, in nice condition, speedometer; £44.— w.

1915 Combination, nice order; £48.—Percy Co., 337, Euston Rd., London. [4567

1913, 3½h.p., 2 speeds; £25.—47, Streatham . S.W.2. [4546

I.O.M. model, 3-speed; £37/10; E.P. or ex- ge.—Service Co., 292, High Holborn, London. [X3439

1914, 3½h.p., 2-speed, kick start, tyres good; ain, £25.—Lay, The Hut, Hilliard Rd., North- ddlesex. [4446

Late 1917 4¼h.p. Combination, done 600 miles, ıp, speedometer, spares, and all accessories; fea, 208, Northcote Rd., Walthamstow, E.17. [4556

¼h.p. B.S.A., countershaft model, 3-speed gear, k starter, Amac carburetter, tyres as new, in- ll accessories; £47/10.—Smith, Aldham, Col- [4462

1917 Model H., with F.R.S. lamp, Smith trip l watch speedometer, new, ridden 263 miles ner joined up; £65 spot cash.—Hucklebridge, ne St., London, S.W.1. [X3292

B.S.A. Combination, countershaft 3-speed gear, art turnout; £65; property of an officer; also 15, countershaft, 4¼h.p. B.S.A., price 50 gns pe's, 9, Shoe Lane, London. [4552

TROWARD and Co., 31, 40b, and 78, High Hampstead.—1913 B.S.A., 3½h.p., 2-speed, dal start, 24 gns.; 1913 B.S.A., countershaft e 2-speed combination, 32 gns. [4385

.S.A. Combination, 4¼h.p., chain drive, 3- ed, kick start, complete with all accessories, gements for running on paraffin, nearly new -Pickering, Mardol, Shrewsbury. [X3050

1917, 4¼h.p., 3-speed countershaft, Mills- rd sidecar, elaborately equipped, whole outfit d, only done 500 miles; £90.—Mebes and 4-6, Gt. Portland St., W.1. Tel.: 3426 May- [4524

.S.A. and Sidecar, 4¼h.p., all chain drive, as dynamo lighting and horn, luxurious side- stered in Bedford cord, very good condition ; £65.—Elce and Co., 15-16, Bishopsgate Av., St., E.C.3. [0492

915 Model H. Combination, in perfect condi- very little used; any trial; new Palmer cord t lamps, Watford speedometer, Roby muffs, Lucas horn; seen any time by appointment; rth of spare parts and accessories; £75 lot. Dining Rooms, 468, Harrow Rd., W.9. [4505

Calthorpe.

ORPE, new, 2¾h.p., 2-stroke, 2-speed; £36/10 kering, Mardol, Shrewsbury. [X3046

ORPE, 2¾h.p., new condition and running . 100 m.p.g.; bargain, £16.—Hunt, 83, Pasture . [X3357

ORPE-J.A.P., 2¾h.p., new models, £39/18; single-speed model, £32; also a second-hand £15.—Wauchope's, 9, Shoe Lane, London. [4553

ORPE Motor Cycles.—All models in stock for ediate delivery; trade supplied; no permits P. J. Evans, 91, John Bright St., Birming- [4309

TROWARD and Co.—Calthorpe, 2-stroke, , 2-speed, 22 gns.; 1916, 2-speed, 26 gns.; Jap, 1915, 2-speed, clutch, 24 gns.—31, 40b, igh St., Hampstead. [4387

Campion.

TROWARD and Co., 31 and 40b, High St., mpstead.—Campion-Jap, 1915, 4h.p., 2-speed ft; 37 gns. [4584

ON 1917 8h.p. J.A.P. Combination, 4 speeds only 600 miles, fully equipped, indistinguish- new; £80.—Percy and Co., 337, Euston Rd., [4571

Chater-Lea-T.D.C.

R-LEA, with 3½-4h.p. T.D.C. engine, adjust- pulley, purchased June last, receipt shown. k-ends only until October, £27; light sidecar £5; both £30.—Hazledine, 39, Wellington St. Dock. [X3360

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1915 11 h.p. **LAGONDA,** 4-seater, 5 wheels, fully equipped	£150 0

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1915 2¾ h.p. **HOBART-VILLIERS,** 2-sp., 2-stroke	£27 10
1915 4 h.p. **A.J.S.** Combination, spare wheel	£75 0
1915 4½ h.p. **EXCELSIOR** Combination, 3-sp. countershaft, kick-starter	£45 0
1914 7-9 h.p. **INDIAN,** clutch model	£35 0
1912 **DOUGLAS,** 2-speed	£22 10

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MOTOR CYCLES FOR SALE.

Clyno.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—1915 De Luxe Clyno combination, spare wheel, hood, screen, 69 gns.; 1915 Clyno, 2-stroke 2-speed, clutch, 23 gns. [4580

CLYNO, 1915, 2½h.p., 2-stroke, 2-speed, handle-bar clutch, fitted for paraffin, fitted with Henderson featherweight sidecar, splendid condition; £25.—Box 1,841, c/o *The Motor Cycle.* [X3385

CLYNO 1914-15 Combination, 6h.p., 3 speeds, kick starter, and free engine, detachable wheels, spare wheel and tyre, hood and screen, beautifully sprung de luxe sidecar, all accessories; £65, guaranteed.—Wauchope's, 9, Shoe Lane, London. [4555

Dalm.

RIDER TROWARD and Co.—Dalm 2-stroke, 1917, as new; 19 gns.—31, 40b, and 78, High St., Hampstead. [4389

Diamond.

DIAMOND, 1913, countershaft 2-speed gear, chain drive; £25/10.—Motor Exchange, Horton St., Halifax. [4483

RIDER TROWARD and Co.—Diamond, 1915, 3h.p., 2-speed, excellent order; 29 gns.—31, 40b, and 78, High St., Hampstead. [4390

Dot.

RIDER TROWARD and Co.—Dot-Jap 1913 6h.p. 2-speed combination, very fast; 35 gns.—31, 40b, and 78, High St., Hampstead. [4391

1915 8h.p. Dot-Jap, all chain countershaft, 3 speeds, coach sidecar, electric side, rear, inspection lamps, acetylene head, speedometer, mirror, full kit spares, splendid condition, recently overhauled, sporty turnout; must sell; £70, or nearest.—Beresford, Rock House, Macclesfield. [X3351

Douglas.

DOUGLAS, 1911, 1912, 1913, 1914, 1915, and 1916 models in stock; prices from £12.—Below.

DOUGLAS 4h.p. Combination, good condition; £52.—Percy and Co., 337, Euston Rd., London. [4562

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

DOUGLAS, 2¾h.p., 2 speeds, kick starter, and speedometer; £25.—47, Streatham Hill, S.W.2. [4548

1914 T.T. Douglas, 2-speed, Lucas lamps and horn, perfect condition; £30.—The Oak, Cannhall Rd., Leytonstone. [4456

DOUGLAS, 2¾h.p., late 1914, new tyres, spares, perfect order; £32.—Rudge jun., Baysham, Ross, Huddersfield. [X3358

MOTOR CYCLES FOR SALE.

Douglas.

DOUGLAS, 2¾h.p., K.S., absolutely reliable, a little ripper; selling no fault.—T. Drayson, 8, Edward Rd., Canterbury. [X3413

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50. [5855

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

1915 3-speed T.T. 2¾h.p. Douglas, new tyres, very fast and perfect; £45, or exchange higher power and cash to value.—T., 85, Revelstoke Rd., Wimbledon Park. [X3355

DOUGLAS, 1913, 2-speed, Bosch mag., £32/10; Model V, practically new, issued late 1917, £55; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X3427

4h.p. 1915 2-speed Douglas, semi T.T. bars, excellent machine, in good sound condition throughout; bargain at £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [4554

DOUGLAS, 2¾h.p., 1913, 2-speed, Bosch, Amac, in good condition; must sell; owner joining army; best offer over £20.—J. H. Hyams, 47a, Picton St., Camberwell, S.E. [4502

DOUGLAS, 1914 T.T. model, only used three months, perfect condition, new licences, accessories and spares; sacrifice £35, or near offer.—Captain Alexander, 129, Marine Parade, Brighton. [4474

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1912 single speed, £15/10; 1913 2-speed, £31/10; 1914, 2 speeds, £34/10.—Motor Exchange, Horton St., Halifax. [4484

RIDER TROWARD and Co.—Douglas, 1914, 2-speed, clutch, kick start, 34 gns.; 1914 T.T., 2-speed, 34 gns.; 1913 T.T., 2-speed, 27 gns.; 1913 single-speed countershaft, 21 gns.; 1912, 2-speed, 19 gns.; 1912, single speed, 17 gns.; 1911 single speed, 14 gns.; Douglas spares in stock, including gear boxes and engines. [4368

LATEST 2¾h.p. W. Douglas, brand new, with the new pattern hand-controlled clutch, the latest front forks, and many other improvements, £54, plus 20%; also U. and V. models, 1916 specification, £50, plus 10%; absolutely new; immediate delivery against priority permits for doctors, farmers, war and munition workers.—How and where to apply, full particulars, write Douglas Specialists, Robinson's Garage, Green St., Cambridge. [4539

Edmund.

EDMUND (late type), with nearly new sporting canoe let coachbuilt sidecar, twin M.A.G. engine, mag. Enfield 2-speed, kick, chain drive, lamps, horn; 46 gns.; lightweight part exchange; also easy terms.—Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station) [4531

Enfield.

3h.p. Enfield, 2-speed, splendid condition, little used just overhauled; £30.—Palmer, Marine House Hythe, Kent. [4507

ENFIELD 1915-1916 6h.p. Combination, good tyres, fine puller; 70 gns.—Farrar's Motors, Hopwood Lane, Halifax. [4338

1913 Enfield Twin, 3h.p., 2 speeds, splendid condition, little used since 1914; £25.—Box L5,930, c/o *The Motor Cycle.* [4442

ENFIELD Combination, 6h.p., 1916, in perfect condition, only run 1,500 miles; £75.—Ferrington, Avonside, Evesham. [X3399

ENFIELD 1914 6h.p. 2-speed Coach Combination, in fine order, £62/10; 1915 model, £72/10; 1916, £82/10.—Motor Exchange, Horton St., Halifax. [4485

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

RIDER TROWARD and Co.—Enfield, 1915, 3h.p., 2-speed, clutch, kick start, 33 gns.; 1916 Enfield standard combination, 73 gns.—31, 40b, and 78, High St., Hampstead. [4392

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X3432

6h.p. 1917 Royal Enfield Combination, hood, screen, all the best accessories and speedometer, thoroughly overlooked by makers, and not used since; £97/10, guaranteed.—Seen at Wauchope's, 9, Shoe Lane, London. [4551

1914-15 6h.p. Enfield Combination, fully equipped. Lucas's lamps, mirror, horn, speedometer, quantity spares, extra tyre and tube, done just over 2,000 since new, exceptionally fine condition throughout, all tyres just as new; a great sacrifice, £60.—J. Parker, Allbrook, Eastleigh. [4518

Elswick.

1916 Elswick-Precision, 3-speed, and accessories, in good condition, just been overhauled; £45.—Jarrett, 28, Westcliff Rd., Whitstable, Kent. [4479

Excelsior.

EXCELSIOR, 2¾h.p., 2-stroke, chain drive, not done 3,000 miles, in best order; £34.—Dr. Roe, Ramsey, I.O.M. [4444

ll letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Excelsior.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1917 American Excelsior, dynamo lighting combination, hood, screen, run 50 miles, 93 gns.; 1915 American Excelsior, mag. model, sporting torpedo-shaped coachbuilt sidecar, 65 gns.; both are 7-9h.p., 3-speed countershaft, all chain drive, clutch and kick start. [4383

F.N.

F.N., 1912, 2½h.p., mag., Bosch. 2-speed shaft, good condition; £11.—137, Percy Rd., Shepherds Bush, W.12. [4459

Grandex.

GRANDEX-PRECISION, 4h.p. twin, Enfield 2-speed, handle starter, 1914 model; 20 gns.—W. Norman, 100, Acre Lane, S.W.2. [4522

Harley-Davidson.

1917 Harley-Davidson, hood, screen, De Luxe car; offers wanted.—27, High St., Doncaster. [4436

HARLEY-DAVIDSON 1915 Combination, in real nice order throughout; £50.—Percy and Co., 337, Euston Rd., London. [4559

1917 Harley-Davidson, electric model, just as new, not ridden 400 miles, best combination on the road; 100 gns.—Farrington, Avonside, Evesham. [X3398

1917 Harley-Davidson Combination, magneto model, lamps, and horn, excellent condition; £115.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0491

RIDER TROWARD and Co., 31, 40b, and 78, High St Hampstead.—1915 Harley-Davidson, dynamo lighting combination, 7-9h.p., 3-speed, 69 gns.; Harley parts stocked. [4394

HARLEY-DAVIDSON Combination, 1915 model, bought August, 1916, 7-9h.p., for sale, in perfect condition; £70.—Phillips, Pioneer Hotel, Cwmfelinfach, Ynysddu, Mon. [4503

HARLEY-DAVIDSON 7-9h.p. Combination, late 1915, splendid condition, all lamps and spares; best offer; owner joining up.—Rowe, Rifle Crescent, Whitehead Rd., Aston, Birmingham. [X3400

HARLEY-DAVIDSON 7-9h.p. Combination, coachbuilt, complete, wind screens, P. and H. head lamp, acetylene rear and sidecar, horn, speedometer, tools; all perfect; £95.—Box 1,830, c/o *The Motor Cycle.* [X3324

LATE 1916 Harley-Davidson Combination, unapproachable condition, as new, electric light, Pillion seat, Klaxon, everything complete, only used four months; £75.—Apply, Flight Sergeant Brown, No. 5 Stores Depot, R.F.C., Empress Hall, Earl's Court. Tel.: Western 3381. [4480

Harris.

HARRIS-PEUGEOT, 1913, 4h.p., clutch; 19 gns.—Rider Troward and Co., 31 and 40b, High St., Hampstead. [4585

Hazlewood.

HAZLEWOOD 1914 Combination, 5-6h.p. J.A.P. engine, kick starter, speedometer, Lucas horn and lamps, coachbuilt sidecar; £45.—Eastwood, 41, Woodlands, Beverley. [4526

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X3430

Henderson.

HENDERSON Combination, latest model imported, run about thousand miles; £95.—Postmaster, Banchory. [X3320

Hobart.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1915 Hobart 2-stroke, 2-speed, clutch, 22 gns.; 1914 Hobart lady's lightweight, 3-speed, clutch, pedal start, 29 gns. [4396

Humber.

HUMBER, 1912, 3½h.p., 2 speeds, handle starting; £18/10.—Motor Exchange, Horton St., Halifax. [4487

HUMBER and Sidecar, 1912, good condition, 2-speed; £28.—Easter, 9, St. Paul's Rd., Canonbury, London. [4460

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Immediate delivery of the new 3½h.p. fleet twin Humber, 3-speed, £75; also one soiled 1918 6h.p. water-cooled Humber, flat twin, 3-speed, Cooper de Luxe 30 gn. sidecar, 95 gns. [4395

Indian.

INDIAN 1916 Powerplus Combination; £85.—47, Streatham Hill, S.W. [4545

INDIAN Powerplus 1916 Electric Equipped Combination, indistinguishable from new; £80.—Below.

INDIAN Powerplus 1916 Combination, in exceptional nice condition; £67/10.—Below.

INDIAN Late 1915 Combination, electric equipment; £55.—Below.

INDIAN, 1915, run 500 miles only, indistinguishable from new; £50.—Percy and Co., 337, Euston Rd., London. [4560

INDIAN, 4h.p., 2 speeds, £22/10; 7-9h.p., free engine, twin, £23/10; 1914 7-9h.p., 2-speed, spring frame, Millford sidecar, £49/10.—Motor Exchange, Horton St., Halifax. [4486

Special Offer This Week.

Latest Model T.T. **ROVER,** with Philipson pulley. Not done 250 miles. Maker's list price to-day £67 10s. **45 Gns.** only.

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NORTON Big 4, all chain, 3-speed	**75 Gns**
A.J.S., 6 h.p., 3-speed, and Sidecar	**£113 6**
NEW IMPERIAL-J.A.P., 2-sp.	**39 Gns**
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MOTOR CYCLES FOR SALE.

Indian.

INDIAN, 1914. 7-9h.p., T.T. bar, speedometer, etc., perfect condition; £35.—F. Hogg, 112, Tennyson Rd., Kilburn. [X3375

INDIAN, late 1915, 5h.p., 3 speeds, with sidecar, splendid condition, lamps, horn, etc.; £50.—Bigwood, 86, High St., Feltham, Middlesex. [4451

1915 7-9h.p. Indian Combination, 3-speed, spring frame, electric lights and hooter, all perfect condition, £10 spares; £65, or near offer.—The Oak, Cannhall Rd., Leytonstone. [4455

1916 5-6h.p. Indian, with Millford sidecar, lamps, horn, spare chains, valves, done 2,000 miles, 60 m.p.g., perfect condition; bargain, £45.—Lieut. Stileman, seen at Roper's Garage, 166, London Rd., Sheffield (1) [X3402

1916 7-9h.p. Powerplus Indian, T.T. bars, speedometer, watch, lamps, tools, and small spares, the whole outfit in perfect condition, and equal to new; £58, a snip; seen near Ipswich.—Box L5,960, c/o *The Motor Cycle.* [4501

INDIAN, spring frame, 1915½, 7-9h.p., 3 speeds, with Millford sidecar, electric lights and horn, speedometer, brand new tyres, engine, etc., overhauled, and in perfect order; bargain, £50; run 2,500.—Box 1,843, c/o *The Motor Cycle.* [X3409

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead, have the following Indians in stock for immediate delivery: One 1916 Powerplus Indian. 8-10h.p., 3-speed, T.T. bars, 59 gns.; one 1915 7-9h.p. Indian, 3-speed, electric light, Phœnix coach sidecar, disc wheels, 59 gns.; one 1914 7-9h.p. Indian, 2-speed, coachbuilt combination, electric lighting, in fine mechanical order, 52 gns.; three 1915 T.T. 7-9h.p. Indians, clutch models, one with disc wheels, 37 gns. each; one 1915 T.T. 5h.p. 3-speed Indian, 39 gns.; two 1914 7-9h.p. Indians, spring frame, 2-speed clutch models, 36 gns. each; two 1914 7-9h.p. clutch model Indians, 29 gns. each; also most Indian parts. State requirements. [4398

Ivy.

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—1915 Ivy, 4¼h.p., 3-speed, clutch, kick start, coachbuilt sidecar, 37 gns. [4397

James.

RIDER TROWARD and Co., 31, High St., Hampstead.—James, 1914, 4¼h.p., 3-speed, clutch; 29 gns. [4586

JAMES, all new models; extended payments or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X3425

MOTOR CYCLES FOR SALE.

James.

RIDER TROWARD and Co., 31, 40b, and 78 St., Hampstead.—1916 James, 2-stroke, 2 27 gns.

1914 James, Combination, all accessories, screen, as new throughout; cheap, £4 1,835, c/o *The Motor Cycle.*

BRAND New James, 5-6h.p., 1918; owner no use; not unpacked, magnificent outfit; £8 doctor or for war work.—Hollywood, St. James Croydon.

J.A.P.

1914 6h.p. J.A.P., Chater-Lea frame. sidecar, sories. Bosch; £27/10; good condition.—(Australian Hospital, Harefield, Middlesex.

Kerry.

RIDER TROWARD and Co., 31, 40b, and 7 St., Hampstead.—1912 Kerry-Abingdon clutch combination, 24 gns.; 1914 T.T. Kerry don, 24 gns.

Lea-Francis.

RIDER TROWARD and Co., 31, 40b, and 7 St., Hampstead.—1915 Lea-Francis, 3½h. J.A.P., 2-speed, all chain, clutch, kick start; 4

Levis.

LEVIS Popular, run 500 miles, in crate; £20.- Smart, Brackley, Northants.

LEVIS, 2-speed, £25; single, £19/10; E.P. change.—Service Co., 292, High Holborn,

1915 2¼h.p. Levis 2-stroke Popular Model, cellent order; £25.—Robinson's Garage, St. Cambridge.

LEVIS Model de Luxe, 2¾h.p., late 1914. condition; nearest offer to £25.—Gardner St., St. Day, Cornwall.

RIDER TROWARD and Co., 31, 40b, and 7 St., Hampstead.—1916 Levis, 2¼h.p. Pop fine condition; 21 gns., complete.

LEVIS Popular, 1915, in splendid running or condition, good tyres, accessories; owner combination; £16, an absolute bargain.—G. Ea 269, Dumers Lane, Radcliffe, Lancs.

LIGHTWEIGHT 2-stroke, 2¼h.p. Levis engin ally built, Chater-Lea fittings, ridden few practically new; exceptional bargain, quick sale, 11, Loudoun Mews, South Hampstead, N.W.8.

Lincoln-Elk.

RIDER TROWARD and Co., 31, 40b, and 7 St., Hampstead.—1913 Lincoln-Elk, 3½h. able gear, will take sidecar; 19 gns.

LINCOLN-ELK, 1914, 6h.p., countershaft ge and chain drive, underslung coach sidecar; Motor Exchange, Horton St., Halifax.

Matchless.

6-8h.p. Matchless-Jap, 2-speed, free engine, co sidecar, re-enamelled and overhauled, not since; £45.—W. Gale, Baker St., Enfield.

MATCHLESS Latest War Model Combinatio plete with detachable wheels, spare wheel a £120.—Exeter Motor Cycle Co., Ltd., Bath Rd.,

MATCHLESS M.A.G. Combination, perfect, lighting sets, wind screen, tyres unpunctu fit as new; £70, lowest.—Box L5,959, c/o *Th Cycle.*

1918 Matchless Combination, J.A.P., W.O. spare wheel, electric lights, horn, luggage unscratched condition; £120.—Elce and Co., Bishopsgate Av., Camomile St., E.C.3.

MATCHLESS 8h.p. Combination, J.A.P. M.A.G. engines £67/10; 8h.p. combinatio fitted with J.A.P. or M.A.G. engines; E.P. or ex —Service Co., 292, High Holborn, London,

RIDER TROWARD and Co., 31, 40b, and 7 St., Hampstead.—Matchless 1916 8h.p. coachbuilt combination, 69 gns.; Matchless 19 J.A.P. coachbuilt combination, 59 gns.; both a 3-speed, clutch, and kick start, all chain drive Matchless 1913 6h.p. 2-speed J.A.P. coachbu bination, 35 gns.

Minerva.

RIDER TROWARD and Co., 31, 40b, and 7 St., Hampstead.—Minerva, 1910, 3½h.p., B. and B., running order; 9 gns.

£10/10.—Minerva combination, wicker sidecar spring forks, Brooks saddle, take three an Nash, 49, High St., Kingston-on-Thames.

Monopole.

1916 Monopole-Villiers, luxurious sideca speeds, hand clutch, drip feed, light torp car, Pillion seat, lamps, horn, spares, exce smart, powerful; £35, nearest.—24, Townley wich.

Motosacoche.

RIDER TROWARD and Co., 31, 40b, and St., Hampstead.—Motosacoche, nearly ne 3½h.p. twin M.A.G., De Lissa air-cooled exhau Enfield gears, clutch, and kick start, 46 gn ditto, 32 gns.

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The Committee of Reconstruction.

THE bare announcement made last week of the formation of a committee to look after motor interests as a part of the engineering trade, in matters relating to reconstruction, will probably strike the majority of our readers as something which does not concern them at all intimately. Were we to jump to any such conclusion we might later on find ourselves very much in the wrong. The first point which connects this matter with motor cycling interests is to be found in the inclusion upon the committee of the name of Mr. Stocks, who, as general manager of Components, Ltd., is closely connected with the Ariel motor cycle. Mr. Stocks was recently elected chairman of the Motor Cycle Section of the Association of British Motor and Allied Manufacturers upon the retirement of Mr. Charles Marston, of the Sunbeam, necessitated by the loss of his father and brother. The inclusion of Mr. Stocks on the committee of the motor industry shows that the motor cycle is to be regarded as coming within the sphere of operations of the committee. Incidentally, this is, we believe, the first occasion upon which the policy of associating the motor cycle with the motor industry, by forming a special branch of the A.B.M.A.M., has been clearly justified as affording a means of getting official consideration for the motor cycle on account of its relation to the motor car. It is not probable that the Minister of Reconstruction would have considered any suggestion for the formation of a committee specially to watch over motor cycling interests, and therefore, had not this liaison existed, our industry might have been left in the cold.

The next point is that the work of forming sub-committees specially representative of various sections of the industry is in progress. Doubtless, one of these sub-committees will be representative of the motor cycle manufacturers, and at this juncture we should like to emphasise the importance of full collaboration between the Association of British Motor and Allied Manufacturers and the Cycle and Motor Cycle Manufacturers' and Traders' Union in this matter. Properly handled, the position may serve to bring these two bodies into permanently intimate touch with each other. Badly handled, it may lead to a dangerous breach.

Now we come to the real point of the whole matter from the standpoint of the motor cyclist. Assuming that the manufacturer of the motor cycle is well assured of a hearing from the Government with regard to all his reconstruction proposals, the motor cyclist may reasonably expect to benefit. It will not do the manufacturer much good to get materials and permits for the construction of new models, or facilities for increasing his works and output, unless he can sell his machines, and his ability to sell depends on whether the motor cyclist is prepared to buy. This in turn depends on a number of things. However bad the conditions, there will always be some riders keen enough to buy and use their machines. There must be many other potential buyers, however, who will not be prepared to come into the market unless they are assured that they are not going to be too heavily taxed or made the subject of grandmotherly legislation. They will also want to feel certain that they are going to have decent roads upon which to travel. It is now in the power of the manufacturers to point out directly and strongly to the Government that unless these conditions are assured they will not be able to sell enough of their machines to keep their plant and their men busy. Thus, by a rather roundabout way, we come to see how the formation of this new committee for the motor industry may react to the very distinct benefit of the motor cyclist. We trust that the manufacturers will all along bear in mind their dependence upon the rider and the need of catering for his welfare. If they do so, all will be well, and very much to the benefit of all concerned.

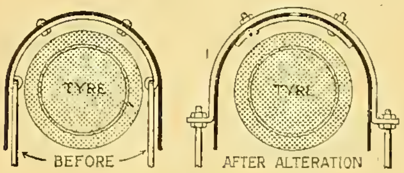
An index to the advertisements in this issue will be found on the page facing the back cover

IDEAS: Useful and Ingenious.

MUDGUARD CLEARANCE.

An easy way to get over the difficulty of mud-clogging in guards not having sufficient clearance is given below.

Cut off the stays of the front guard as close up to the guard as possible, and thread each end for ¾in. Remove the arch and rivets entirely from the guard, and cut off the remains of the stay ends, leaving only a short arch. Make of scrap metal a pair of arches to go over instead of inside the guard, and a few odd nuts and pins will complete the job as in diagram. The outside stays give a stronger hold on the guard, and when the stay ends are not inside, little or no clogging occurs. Why they were ever put inside is a mystery.—Cyril Jones.

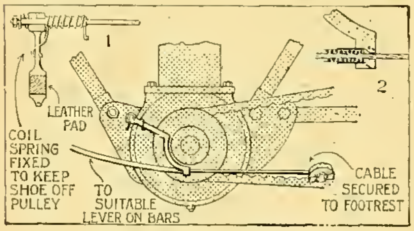


Remedying the fault of insufficient mudguard clearance.

SIMPLE CONTROL FOR A PHILIPSON PULLEY.

The following description is of a simple control for a Philipson pulley:

The top front cradle plate is taken from the engine and a long special stud made, as shown in fig. 1. On to this is fixed a brake shoe to brake, of course, on the Philipson drum. A Bowden cable is attached to the wire which runs through the shoe and is fixed to some suitable part of the machine behind the pulley—in this case to the footrest. The casing of the cable butts up against the front of the shoe, as shown in fig. 2. The Bowden wire is then taken to a suitable lever on the bar. When the lever is pulled, the outer casing of the cable pushes the shoe against the pulley. The idea is well worth the small amount of trouble involved.—W.J.R. (Birmingham).

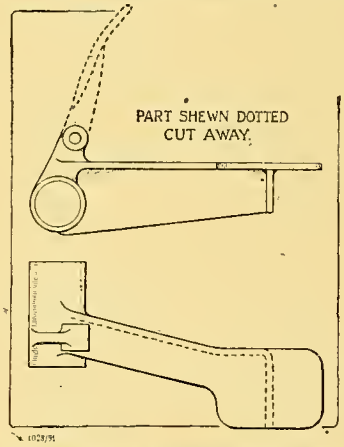

1
2
LEATHER PAD
COIL SPRING FIXED TO KEEP SHOE OFF PULLEY
TO SUITABLE LEVER ON BARS
CABLE SECURED TO FOOTREST

A control for a Philipson pulley.

ALTERING A DOUGLAS BRAKE PEDAL.

Riders of those Douglas models which have footrests fitted in place of footboards, and on which the pedal that operates the rear brake is fitted in a more or less vertical position just forward of the starboard footrest, may be interested in hearing of an interesting alteration which makes the operation of the back brake easier and more certain.

The sketches will show how the alteration was carried out. The pedal now lies snugly just inside the front part of my right foot, and by turning the foot slightly inwards the toe falls naturally on to the new brake pedal, while the arch still remains comfortably on the footrest. Arranged thus, the brake is usable, and can be relied upon in an emergency.



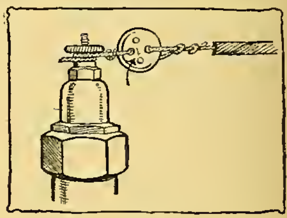
Alterations to a Douglas brake pedal.

The alteration was carried out by welding two pieces of 10 s.w.g. mild steel plate together to form a lever of Γ section, and then welding this lever on to the base of the existing pedal. That part of the pedal immediately above the boss which is tapped to take the pin that carries the yoke end of the brake pull rod was cut off.

A heel-operated lever would doubtless have been preferable, but it would have been very much more elaborate in shape, as it would have had to be formed to clear the footrest tube. The length of the brake pull rod would also have been increased, so the idea was given up, and the lever fitted as shown.—F.B.S.

A SIMPLE SPARK GAP.

This is made by interposing an ordinary bone sleeve button between the sparking plug terminal and the high-tension wire. One end of the wire is looped through one hole in the button, and the opposite hole in the button is connected to the terminal by means of a piece of copper wire, as shown clearly in the sketch.—*L'Automobile aux Armées.*



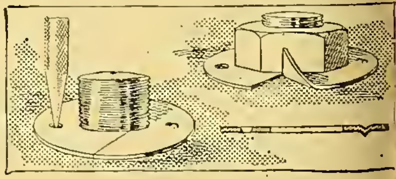
A simple spark gap.

EMPTYING A PETROL TANK.

One occasionally has to empty the tank of a motor cycle, and this is usually a long and tedious job if any quantity of spirit is inside. To speed things up somewhat, unscrew the bulb of the horn and take the cap of the tank. Place the end of the bulb into the opening of the tank, and simple pressure of the bulb will cause the petrol to run out at least twice as fast.—H.D.J.

A LOCK WASHER.

A neat idea for preventing nuts from working loose under vibration has been introduced recently. It consists of a soft iron washer having a slo in one side and a small hole drilled a the same radius as a projecting point o the underside. The washer is place over the bolt end, a centre punch i tapped through the hole, and the washe turned until the projection drops int place in the punched hole underneath The nut having been fully tightened, th slotted part is turned up vertically agains the nut, which is then firmly locked i position.



A simple locking washer.

Occasional Comments

By IXION

Braking Strains.

MR. D. HEATHER, B.Sc., has been lecturing in Coventry on motor car brakes, and several of his points affect motor cycles. He is a reat advocate of fitting brakes to the front wheels f a motor car as well as to the back axle, and gives ie following reasons :

(1.) If you brake only half the available number f wheels, you sacrifice 50% of your potential braking ırface and power.

(2.) A rotating wheel resists lateral tendencies, e., is not so liable to skid as a locked or nearly cked wheel; therefore the ideal brake system slows own one rear wheel and one front wheel on opposite des of the car.

(3.) Driving strains act in the opposite direction braking strains: opposed frictions are, therefore, enerated between the layers of fabric in the rear re casings. Front wheels carry no driving strains, nd front tyres are therefore almost impervious to raking strains.

Applied to Motor Bicycles.

SO far as (1) and (3) are concerned, the arguments apply equally to two-wheeled motors. As regards (2), we all know that a motor cycle kids if its rear wheel is decelerated violently, and iat it skids far more uncontrollably if its front wheel violently braked. Has any reader ever experimented with interconnected front and rear wheel rakes on a two-wheeler, so balanced that the rear heel receives slightly more brake than the front heel? This might prove to be the ideal system. At resent manufacturers are afraid to fit front brakes f any real power, because a skid is inevitable if the ront brake is used alone or used more forcibly than he rear brake—two blunders which a novice is sure perpetrate. Yet the rear wheel brake, used singly, inadequate in real emergencies. In tight corners sudden stoppage always means more or less of a kid, and the skid is corrected and neutralised by a kilful rider, though a dud driver generally tumbles ff. Mr. Heather asserts that 65% of motor accidents re ascribable to the brakes, and in this statement e doubtless includes brake failures as well as skids.

The Ideal Motor Bicycle Brake System.

SEEING that a brake exerts its maximum power when the wheel is just not locked, I presume that the ideal system for a motor bicycle would onsist of interlinked front and rear wheel brakes, perated by a single control, and so balanced that the ear brake was always applied with more force than he front; the system would further be so designed hat it would be quite impossible to lock the front wheel, and that very great pressure would be needed to lock the back wheel. Duplicate control gear would probably be found essential to guard against any derangement of a single control. Such a system will not be easy to design. When we further consider that the system must be proof against the neglect and stupidity of a dud owner, especially with regard to its adjustments, the ideal sounds hardly realisable.

Lower Gears.

LT. DEUCHAR need not have cited me as an apostle of high gears. I think that his suggested figure of 6 to 1 is well on the low side even for a single-cylinder sidecar combination, but it is equally certain that a 4 to 1 top is on the high side for a 3½ h.p. solo. In the days of the dear old belt and the adjustable pulley, each man could be a law to himself in this matter, and one saw knuts with more swank than sense trying to run standard Triumphs with front pulleys as big as bread trenchers. The worst of the modern rigid drives is that any variation in gear ratios has to be allowed for in design, and necessitates quite an expensive set of spares. But I think Lt. Deuchar may rest content. Push bicycle makers always give their customers a choice of gear ratios—often between as many as six series. When the trade settles down, the standard 3½ h.p. will probably be catalogued with three different sets—one for fast solo work, one for general purposes, and the lowest series for heavy sidecar duty. I don't suppose, however, that the starting point of the last series will be as low as the 6 to 1 for which he presses.

When Speed is Pardonable.

THOSE motor cyclists who denounce high road speeds wholesale are probably men whose hours on the road are so limited that every moment in the saddle is a joy to them. Let them extend their sympathy to riders like myself, whose mileage perhaps approaches a quarter of a million. Much as we all love our tight little island, no sane man can deny that considerable patches of its road system are exceedingly dull. At first acquaintance, plus the stimulation of an unwonted ride, it is possible to jog slowly over such stretches, and to enjoy the experience. But when one traverses them for the umpteenth time, they become a bore. These duller patches are often comparatively open and empty of traffic. I know many of them over which a cautious rider can maintain an average very considerably in excess of legal limit for hours together, without endangering himself or anybody else. On such rides experienced men naturally open the throttle, and most of us do a bit of road burning. It does not follow that we are soulless maniacs. Put us in a Devon lane, or on Dartmoor, or round Whitby, or in the Lakes, and we jog along at a miserable potter, with our eyes right off the road.

A ROAD TEST of the MILITARY MATCHLESS

The Russian Government Model as a Passenger Machine.

THE 8 h.p. Military Model Matchless-Jap sidecar combination is a mount which was originally intended for the Russian Government, and was built to suit the ideas of the motor cycle experts of our one-time Ally, with the result that it does not quite meet the views of English connoisseurs in all details. Still, there is not much one can criticise in its design, save the very long magneto chain drive, which, together with the high crank case clearance, are features that render the outfit especially suitable for use in our Overseas Dominions.

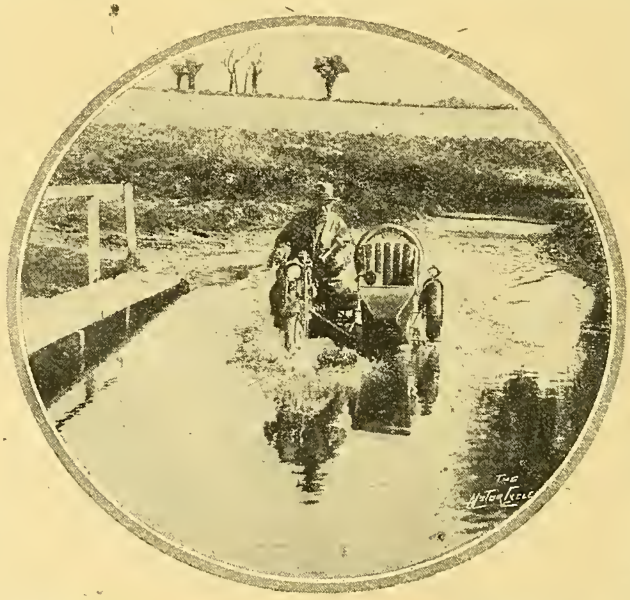
A description of the mechanical features of this machine has already appeared in these pages, but until quite recently we had no opportunity of testing its behaviour on the road. However, as the opportunity did come, we armed ourselves with a special short-period permit and a camera, and gave the combination as good a testing as could be got on a minimum petrol consumption. First of all came a long drive out of London through such traffic as is left in the Metropolis, which was just enough to show that the Matchless was possessed of a very flexible engine which rendered it quite a pleasure to drive in crowded streets. It also showed that Messrs. Collier and Sons, Ltd., had taken the trouble to tune the carburetter carefully, and this, combined with the fact that the inlet unions on the latest type J.A.P. engine are absolutely air-tight, rendered the engine capable of running very slowly. The carburetter was of a pattern which is frequently fitted to motor cycles, but is not by any means automatic, so all the more credit is due to the makers for tuning it so successfully. Still, goes against the grai for the all - roun motorist who ha driven all types of motor vehicl during the last fifteen years to hav to close the air after opening th throttle past the halfway point.

What impressed us most after th flexibility of the machine was i extreme comfort. Furnished with a Brooks saddle, 170, with springs which just suited the rider's weigh and a pair of excellent spring forks, it was difficult t imagine that a spring frame machine could hav afforded greater comfort, and as many who are ab to use a motor cycle at the present time are well awar the roads are in places worse than it was thought i 1914 that English roads could be.

Starting the Engine.

After our journey home, some difficulty was four in starting up the following morning, which was, firs owing to the fact that the driver was unacquainte with the machine, and, secondly, that no compressic taps or priming devices were fitted, since the Russia experts' stipulation of high crank case clearance le no room for these co veniences. To overcon this difficulty we remove one plug and poured a litt petrol first on the pl points and then into tl cylinder. After that tl engine was started, ar when once warm present no further difficulty.

Now, the proper way start the engine of sidecar, which is not well known as it should b is to raise the exhaust val with the right hand ai with the left grip tl luggage carrier. This giv an enormous leverage the kick starter, and t tip when once acquired w enable the largest sidec engines to be start without difficulty, and wi out priming, provided t throttle is only open slightly and the air close



Taking a watersplash comfortably. The high placed magneto and increased crank case clearance enable the Matchless outfit to negotiate the roughest country and to ford fairly deep streams.

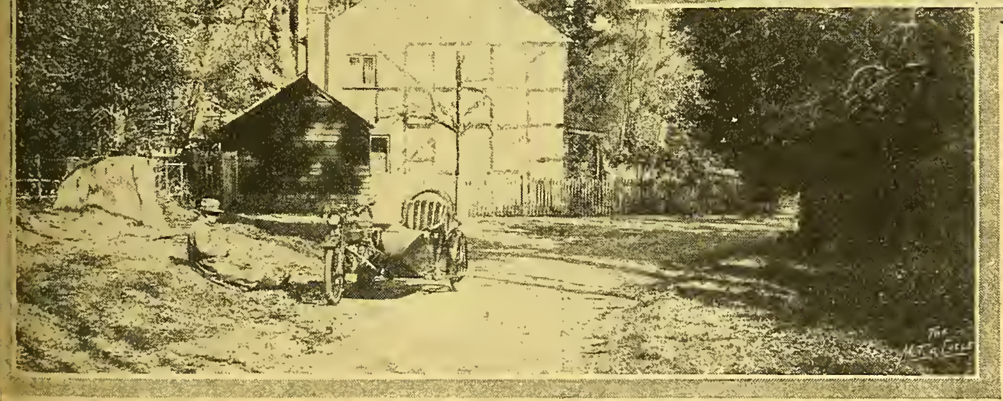
Road Test of the Military Matchless.—

During the test the weather, though brilliantly fine first, became, later, distinctly seasonable. March, is sometimes its wont, went out as it should have ome in—"like a lion"—and "April" showers preominated. This gave plenty of chances of seeing ow the outfit behaved on wet roads, and, though we ere caught in plenty of showers, we never wore leg eralls, and yet the bottoms of our nether garments ere hardly wet and little splashed with mud, so excelntly was the mudguarding carried out. Most of our urneys were along by-roads and well off the beaten ack in search of pretty spots to photograph, which ıtailed slow driving followed by sudden spurts to imb up single figure gradients, nearly all of which ere negotiated on top speed.

The country abounds in watersplashes, and through ıese the machine was taken without hesitation, and, ving to the enclosed chain drive and high placed agneto, they were traversed without the slightest ifficulty, and while the ford was often deep, as is ıown in one of the photographs illustrating this rticle, the rider hardly received a spot of water on is garments.

General Construction.

The machine is strongly constructed throughout, early built to last, and of a quality which a South frican motor cyclist explained to us the other day is ıly to be found in British machines. The Matchless certainly built to stand hard wear and rough usage, and after the war should be ideal as an Overseas model. We naturally drove the machine most of the time it was in our hands, but we did not miss the chance of riding in the sidecar as a passenger, and this we found to be extremely comfortable, even over the roughest roads. Messrs. Collier and Sons themselves admit that this model is not their best, as it was designed for a special purpose, but in our opinion it is a fine machine, especially for Overseas use. We can also speak in the highest terms of the latest J.A.P. engine, which was reasonably silent, and yet quite powerful.



(Top) Near the village of Whitwell. (Bottom) A picturesque scene in the village of Ayot St. Lawrence.

GARAGE CHARGES.

'N the suburbs of most provincial towns there are large numbers of houses renting at about 10s. per week. If one works out the capital involved and he ground area, one must come to the conclusion that ven 2s. per week for garage space for a sidecar comination is too much. It should be possible for an nterprising garage man to build up a big business by letting floor space for one shilling per week. The rider who pays too much rarely buys his supplies from the same garage. If garage rent were low, the rider would be willing to undertake to give the proprietor all his custom, but, as it is, the latter often succeeds in actually driving away other motorists who judge his repair charges by his garaging fees.

Steering and Stability of Single-track Vehicles.

INTERESTING CONCLUSIONS REACHED BY MATHEMATICAL PROOF. Part II.

The following notes on the stability of motor cycles are taken (as promised in our issue for Feb. 14th) from an article, written by Mr. Geo. S. Bower, which appeared in "The Automobile Engineer" for October, 1915. It should be noted that all the statements and conclusions are proved mathematically in the article from which they are taken, and our scientific readers are advised to refer to this article if they wish to pursue the matter further, when they may rest assured of finding much to interest them. We regret that space does not permit of our printing the whole argument.

General Riding Considerations.

In actual practice the rider of a motor cycle progresses in a series of swerves, first in one direction and then in the other, in order to check the constant tendency to fall sideways. The less the amount of swerving required the more comfortable is the machine to ride.

Effect of Vertical Position of Centre of Mass.

It would appear that the height of the centre of gravity of the machine has not so much influence as is generally supposed on its steering qualities. If gyroscopic couples are non-existent, the angle of lean is unaffected by the height of the centre of mass, as also are the values of the road reactions on the two wheels against centrifugal force. The higher the centre of gravity, the greater the amount of inertia of the machine about the ground, and hence the more sluggish it will be in moving in response to the gyroscopic torques used in balancing, for the latter, being dependent on the speeds and masses of the wheels and flywheels, will be approximately the same whether the machine is high or low built. The writer has noticed a motor cycle to steer worse, even on dry roads, when heavy luggage was put on the carrier. This was probably partially due to the fact of the angle of lean being altered from that to which the rider was accustomed. The wobblings to correct errors of judgment thus made would require to be more violent owing to the increased moment of inertia of the machine about the ground. The increased skidding effect due to weight behind has troubled the writer very much, despite what pillion enthusiasts may say to the contrary. Of course, it is *possible* that a very heavy weight behind may squeeze out the liquid mud and so increase the coefficient of friction. One may often notice the dry track left by a tyre on a wet road.

Excessive weight at the front end of the machine (on the handle-bars) has a very bad effect for two reasons. Firstly, it increases the moment of inertia of the front wheel system, and thus renders it more difficult to wobble the front wheel quickly to maintain balance. Secondly, it increases the centrifugal force reaction on the front tyre, and thus increases the tendency of the front wheel to side-slip—a thing to be avoided at all costs. Dropped handle-bars bring the centre of mass of the rider rather lower and more forward, and hence conduce to easier steering and less skidding.

Recovery from a Side-slip.

When a bicycle skids under the influence of the centrifugal force the angle of lean increases, and, if not reduced, the cycle will fall on its side. Now to bring it up vertical again, one instinctively steers towards the side of falling. This increases the centrifugal force, and hence the tendency to side-slip, so that it would appear to be impossible to recover from a skid except by the use of the feet. When we consider the gyroscopic couples due to the rotating parts of the engine, however, we are led to another, and, the author believes, a hitherto unknown method of recovering equilibrium.

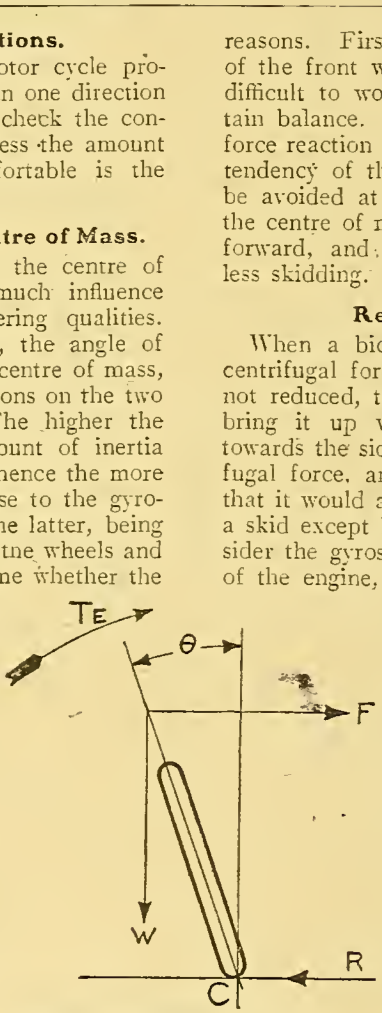


Diagram representing an end view of a motor cycle in motion.

Let the sketch represent an end view of the cycle, looking in the direction of motion. Imagine that as a left-hand turn is being taken, the coefficient of friction between the wheels and ground suddenly decreases in amount. Owing to F not being balanced by the road frictional reaction R, the wheel will slip to the right, thus causing the centre of mass of the bicycle to move in a circle of larger radius, such that F will equilibriate R (R will also increase with the velocity of side-slip). Now just before the instant at which this occurred, the centrifugal force F, together with the gyroscopic torque TE equilibrated the moment of W about C. When slip occurs, however, F is opposed by the resistance to acceleration of the centre of gravity of the machine, the difference between the new resultan

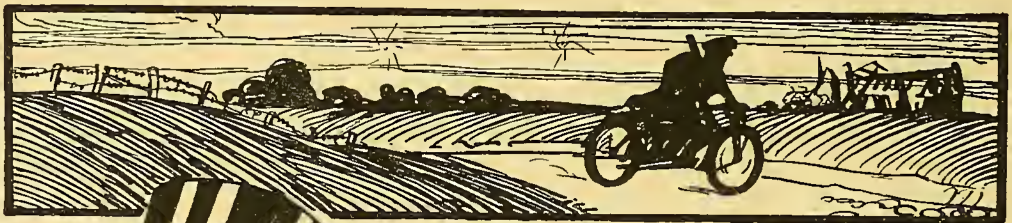
Easy Starting
Under All Conditions

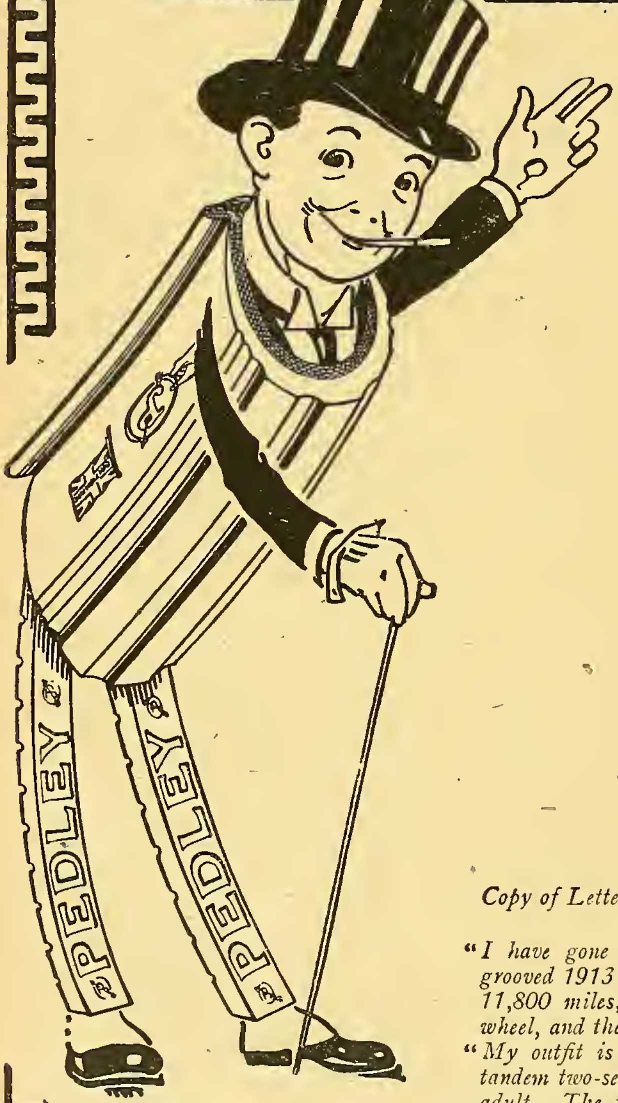
"The other night the bike was left out from 12 a.m. to 8 a.m. in a blinding rain storm. When I got to her in the morning she started up with the first kick."

Extract from a letter received from Dr. G. H——, of Shetland.

Art Catalogue post free.

ARIEL WORKS, Ltd.,
3, BOURNBROOK, BIRMINGHAM.





Mr Just Perfect helps to 'Carry on'

Mr Just-Perfect Helps

Pedley Tyres and Belts are capable of a mileage astonishing to the users of other makes.

Eleven thousand eight hundred miles on a 6-h.p. heavy sidecar combination is the performance that carries proof.

This is the kind of service at your disposal in Pedley Tyres and Belts. They justify their cost many times over, and they help the rider to "carry on" under the worst conditions.

—to 'Carry on'.

Copy of Letter received from Jas. C. Stewart, Inverness, dated 28th Sept., 1917.

"I have gone carefully into the matter of mileage of your 3-inch grooved 1913 Pedley Tyre, and find that the figure is not less than 11,800 miles, of which at least 7,000 has been on the driving wheel, and the balance on the front wheel.

"My outfit is a 6 h.p. Clyno combination with a heavy Millford tandem two-seated sidecar in which I carry two children and an adult. The total human freight on the whole outfit is about 30 stones. This heavy sidecar has been attached all the time except 1913, and my total mileage solo would not exceed 250 miles."

The Performance that carries Proof.

J. PEDLEY & SON, LTD., OXFORD WORKS, GREAT CHARLES STREET, BIRMINGHAM.
LONDON ADDRESS: 30, HOLYWELL LANE, GREAT EASTERN STREET, LONDON, E.C. 2.

eering and Stability of Single-track Vehicles.—

and the old one being equal to the reduction the road friction reaction on the wheel. Thus TE remains constant, the moment of W about C ill bring the machine over on its left-hand side, this eing, of course, what happens in practice (when a ft-hand turn is being taken). Suppose now that the achine is provided with a handle-bar-controlled lutch, and that on the first sign of slip the rider opens e throttle and declutches, allowing the engine to ce, then the gyroscopic torque TE will be greatly creased, and the bicycle will be able to regain its ngular equilibrium about C. Not only this, but the udden acceleration of the flywheel will necessitate a eaction on the frame which will tend to press the ar wheel (which is probably the offender) more rmly on the ground. Of course, if this is overdone e front wheel will skid, and the idea requires to be bmitted to the test of practical experience.

The clutch on the author's machine is not h.b.c., nd he also feels a disinclination for experimental ork on the subject of skidding. Perhaps some nselfish person will take up the work.

Tail Wagging.

This unpleasant phenomenon appears to be due to e variability of the engine torque. At each peak f the engine torque curve the pull on the rear wheel such that it slips slightly in a circumferential direc- on. This, as is well known, greatly facilitates slip- ing in a sideways direction, but before the cycle has ipped far the torque has dropped in value, and the der is able to bring the bicycle straight again by a ight movement of the front wheel.

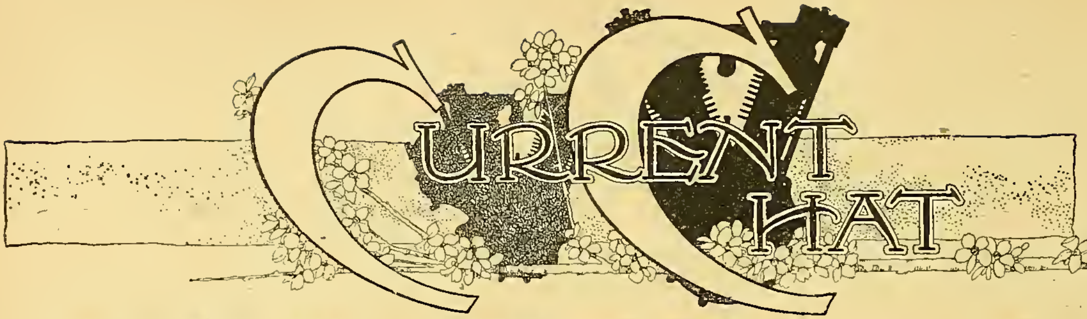
The liability to "tail wag" is increased by the use f a high gear, which reduces the engine speed, and hence the flywheel effect; by a heavy weight behind, which increases the centrifugal reaction on the rear wheel, and by the use of a rigid drive or a very tight belt, which increases the circumferential slip of the rear wheel.

Auto-stability.

By this is meant the property which may be possessed by a cycle of being ridden without the rider touching the handle-bars or moving his body. The subject is one of some complexity, and has not, as yet, been completely investigated by the author. The results will now be given of a mathematical investigation of the "free" motion of an assumed form of bicycle, consisting of a number of isolated masses, and having a vertical steering pillar. It was found that the offset or "castoring" of the front wheel in relation to the steering pillar is most important in its effects on stability, thus bearing out the general opinion on this subject.

If the machine is travelling too slowly to be stable in itself it may still be ridden without touching the handle-bars if the rider moves his body in the correct manner. The connection between the rider and the handle-bars is now a gyroscopic one, instead of being direct. Suppose, for instance, the bicycle begins to fall towards the left, and that the rider instantly leans to the right (an instinctive action). As previously mentioned, the bicycle will lean still more to the left, in order to keep the centre of mass of the machine and rider unmoved. This motion of the bicycle to the left of the vertical constitutes forced precession of the front wheel, and an examination of the directions of the torques shows that the front wheel will turn to the left. This is, of course, the direction required to counteract falling to the left.

One of the Tanks moving up to assist in holding back the Germans during the recent offensive. The Tank played an important and vital part in our defence.



CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

April 18th	8.28 p.m.
,, 20th	8.31 ,,
,, 22nd	8.35 ,,
,, 24th	8.37 ,,

The National War Funds.

The National Relief Fund (distributed £3,793,657)	£6,354,719	0	0
Red Cross Fund	9,876,861	10	11½
Tobacco Fund	157,380	0	0

Three Wheelers.

Several firms well known in the motor cycle world have three-wheel runabouts under way for after the war.

The Motor Cycle in Fiction.

While one daring short story writer has introduced the sidecar combination in magazine fiction, we have not yet come across a novel in which the motor cycle takes a leading part.

The Paper Shortage.

Owing to the serious shortage in the supply of paper, efforts are being made by the authorities to prevent wastage, and any of our readers who come across instances of waste of paper are requested to communicate by letter with the Paper Controller, 23, Buckingham Gate, London.

Sidecar Ambulance Work at the Front.

The French Red Cross are in urgent need of voluntary motor ambulance drivers. The magnificent work these convoys are doing needs no elaboration. It must be realised by every man. All applicants have to be ineligible for active service, or at any rate in very low grades. They, however, must be sufficiently robust to be able to stand open air life, and, at times, periods of considerable pressure of work under trying circumstances. Applications should be made to the French Red Cross, 9, Knightsbridge, Hyde Park Corner, S.W.1.

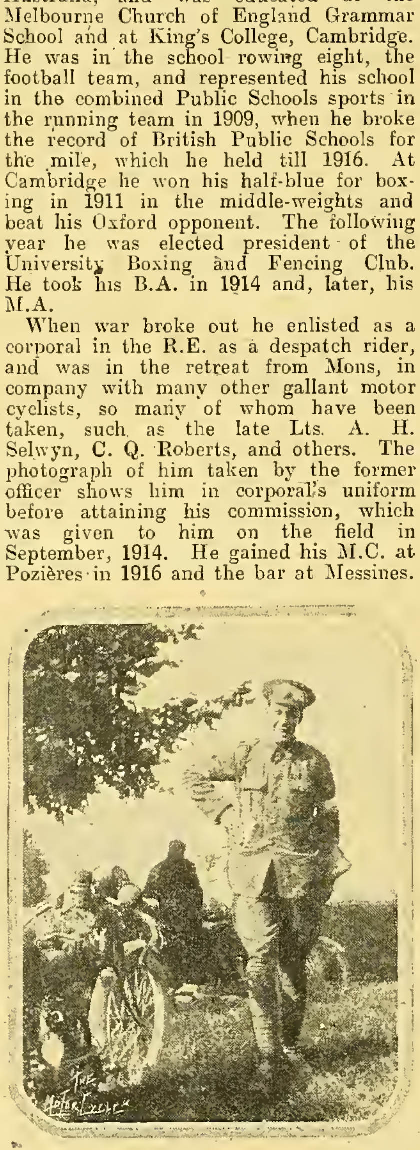
The N.M.C.F.U.

The press secretary of the National Motor Cyclists' Fuel Union, in a contribution to a contemporary, refers to our impressions of a recent meeting of this body which we published in our issue of April 4th. He terms our remarks a misconception of the aims of the Union, which, he claims, is composed of patriots, and that it was unfair for us to suggest unpatriotism on the part of the members. This writer admits that he did not attend the meeting in question. We did attend, and faithfully recorded our impressions, based upon the general tone of the meeting and the remarks of the chief speakers.

Death of a Gallant Despatch Rider.

It is sad to have to record that so fine a motor cyclist as Capt. Ronald Guy Larking, M.C. (and bar), R.E., one of the original B.E.F. despatch riders, was killed in a motor cycle accident abroad. Capt. Larking hailed originally from Australia, and was educated at the Melbourne Church of England Grammar School and at King's College, Cambridge. He was in the school rowing eight, the football team, and represented his school in the combined Public Schools sports in the running team in 1909, when he broke the record of British Public Schools for the mile, which he held till 1916. At Cambridge he won his half-blue for boxing in 1911 in the middle-weights and beat his Oxford opponent. The following year he was elected president of the University Boxing and Fencing Club. He took his B.A. in 1914 and, later, his M.A.

When war broke out he enlisted as a corporal in the R.E. as a despatch rider, and was in the retreat from Mons, in company with many other gallant motor cyclists, so many of whom have been taken, such as the late Lts. A. H. Selwyn, C. Q. Roberts, and others. The photograph of him taken by the former officer shows him in corporal's uniform before attaining his commission, which was given to him on the field in September, 1914. He gained his M.C. at Pozières in 1916 and the bar at Messines.



Capt. Ronald Guy Larking, M.C. (and bar), R.E. who was recently killed in a motor cycle accident.

Special Features.

STEERING AND STABILITY.

NEW U.S.A. ARMY ENGINE.

CHAIN GUARDS.

The Internal Combustion Turbine.

The problem of the internal combust turbine continues to attract motor e neers. We have seen many interest experiments, including a turbine actu in motion, but its fuel consumption out of all proportion to the po developed.

Friction Drive for Motor Cycles.

Several inventors in the past h experimented with friction-driven mo cycles, and, in face of the success the G.W.K. light car, there seems ev promise of ultimate success. Such "gear" offers certain advantages, am which may be mentioned comparat silence, simplicity and low cost.

Sale of Unclaimed S.E.R. Motor Cycle.

Included in the annual auction sale S.E. Railway "unclaimed" prope advertised to take place on April 2 at Holborn Viaduct Hotel is an unkno and nameless motor cycle. No parti lars are given, but a line of raised t is given to this lot. One can understa tyres or motor accessories being l behind after a S.E. Railway journey.

Is it a "War-worn?"

The sale should be worth a visit, only to see this single "unclaime motor cycle. A stolen mount, perha with a history attached, or a return war-worn for the dump that forme existed alongside a S.E. Railway goo siding that perhaps became lost or w astray in transit.

German Atrocities.

An inhabitant of San José, Californ enlisted in the French Army in 1914, a took part in some of the greatest batt in the early part of the war. After t Verdun campaign he became a despat rider on account of his knowledge motor cycles. While on his mount was frequently within, or even behi the German lines, and being now ho on leave he insists that none of the stor prevalent in America concerning Germ cruelty is equal to the actual trut While riding at the back of the Boc lines, as is possible sometimes when t warfare is in the open, he says he often stopped to bind up the bleedi arms of tiny children who have be deliberately maimed for life. This you American, Henry Richer, rides an Indi motor cycle.

Ex-motor Cyclists.

Many old-time competition riders have oined the Air Service "for good," they ay.

oy Sticks.

We anticipate, after the war, quite a number of attempts to embody the prin-iples of the joy-stick control to motor ycles.

The Twin Two-stroke.

At one time designers of twin two-trokes appeared to have been so dis-ouraged that the future of the type was very uncertain. There are now several win engines which promise to fulfil heir designers' expectations, and which include the flat, V and vertical types.

After the War?

We are now frequently receiving a query that we must admit outright we annot answer: "When peace is declared, shall I be able to use my machine at once, or will there e restrictions in force for some ime?"

To these anxious enquirers we enerally reply that, as we have ot yet been informed of the con-itions of peace, we must regret-ully confess our inability to answer the question, but that we eel fairly safe in informing the nquirer that the Defence of the Realm Act will most probably remain in force until it is repealed.

eace and Plenty?

In our opinion, the only way to nsure anything like peace and lenty for the motorist within a reasonable time after the coming f peace is by means of that controversial liquid—alcohol. As far s present indications go, this is the only fuel that will ever be ermanently available in unlimited uantities for this country, and, if t has to come, surely the sooner the better. There is no doubt that petrol will be extremely scarce for many a long day, and it is rather nnoying to think we have an lmost unlimited supply of fuel eld up entirely by antiquated Government restrictions on its sale—restrictions, of course, in no way connected with its use by motorists *as such.*

A Knock.

Is there anything more painful to the expert motor cyclist than to see a smiling self-satisfied novice deaf to the knocking of his engine? Every rider was a novice once, but every novice should know when an engine knocks.

The Designers of the U.S.A. Standard Motor Cycle Engine.

The designers of the U.S.A Army standard motor cycle engine, described elsewhere in this issue, are gentlemen whose names are fairly well-known to English motor cyclists—Mr. William S. Harley of the Harley-Davidson Co., Mr. Oscar Hedstrom of the Hendee Mfg. Co., Mr. Frank Schwinn of Chicago, and Capt. F. C. Hecox, representing the Army. We believe that actually Mr. Hedstrom has been for a large portion of the time replaced in the work by Mr. Charles Franklin.

Noises.

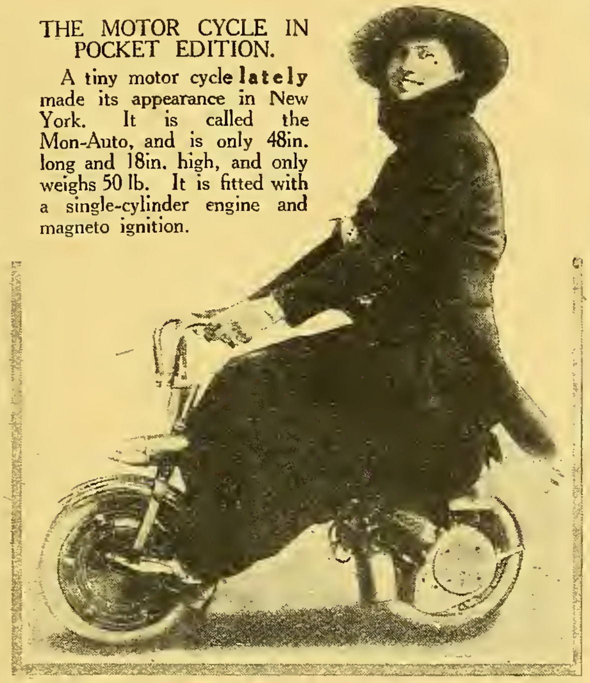
Many things about a motor cycle tend to magnify sounds—air-cooled cylinders and tubular frames being the chief offenders in this respect.

Garaging.

One of the greatest problems to be faced when motor cycling becomes normal again is the question of garaging. Already little groups of motorists in the provinces are making plans to build co-operative garages in which to store and repair their machines.

Expensive Gadgets.

When one considers that some automobilists pay over £1,000 for a car, and equip it with an "all four wheels" jack costing about £50, and a Gabriel horn absorbing another £40, one realises the value to be obtained with a good motor cycle.



THE MOTOR CYCLE IN POCKET EDITION.

A tiny motor cycle lately made its appearance in New York. It is called the Mon-Auto, and is only 48in. long and 18in. high, and only weighs 50 lb. It is fitted with a single-cylinder engine and magneto ignition.

The Humphris Gear.

At least three firms have recently experimented with the Humphris gear, of which the Quadrant and Rex were two. Shall we see motor cycles embodying this interesting patent in the near future?

Oil from Home Sources.

A committee has been appointed to advise to what extent and within what time it should be possible to carry out the proposals of the Petroleum Research Department on the production of fuel oil from home sources.

The King in a Tank.

During the King's visit to Lincoln he expressed a desire to make an excursion in a Tank. "This is my fourth adventure in a Tank," said the King to the officer in charge, "and I want you to take me over the most awkward places." Having been taken over the roughest places the officer could negotiate, His Majesty seemed well pleased with the experience.

The Big Single.

Present tendencies indicate that the very big single of over 700 c.c. will be very uncommon in post-war buyers' guides.

Racing on the Sands.

At North Brighton (N.Z.), in November last, a forty-mile solo race was run by the Pioneer Club (Christchurch). The event was won in 39m. 53s.—*i.e.*, at over a mile per minute—by R. L. Kennett. *Wheeling* of New Zealand, from which paper we take the information of the event, while commenting on the winner's fine riding, says nothing of the machine he rode, not even its make, and yet this paper is the organ of the N.Z.A.C.U.!

The Ladies of Pervyse.

Those two gallant ladies, the Baroness de T'Serclaes and Miss Marie Chisholm, who have done such devoted work for the Red Cross with the Belgian Army in the firing line throughout the war, and who have often been referred to in these pages, have, we regret to say, been badly gassed. It may be remembered that they are both skilful riders of Douglas motor bicycles, which they have used for several years at the Front.

In the early hours of March 17th, during a heavy bombardment, a gas shell burst on the door of their dug-out and blew it in. As there had been no warning of the attack, the two ladies were not wearing gas masks, and consequently are very badly affected.

Both ladies are members of the British Red Cross Society, have received the Order of Leopold, the British Military Medal, and the Royal Order of Elizabeth for bravery and life-saving under fire.

Quick Work.

We know of a middle-aged gentleman who joined the R.N.A.S. as a mechanic, learned "all about" aero engines in a week, and designed an internal combustion turbine for aeroplanes by the end of his first month. Why does every novice fly to internal combustion turbines? The best brains in the automotive world have been devoted to this problem, and we are still using cylinders and pistons.

Bore-stroke Ratio.

Automobile engineers appear to agree that the small bore long stroke engine is the best form of internal combustion motor for high speed vehicles. Some car engines have a stroke over twice the dimensions of the bore, yet motor cycle engines are mostly "square." Why?

Inventive Activity in New Zealand.

We recently stated that the fuel doping craze was afoot in the Antipodes. The latest in this line is the announcement that a flux has been perfected and placed on the market which will braze any metal, including cast iron. We should be glad of an opportunity of experimenting ourselves, but are afraid the chance of realising the hope is somewhat remote.

MILITARY NOTES.

Corroboration of an Extraordinary Story. An Unofficial Badge.

COST OF THE WAR FOR RUSSIA.

IT is estimated in Petrograd that the total cost of the war for Russia is 50,599,275,699 roubles, or about £5,059,927,569.

* * *

THE CROIX DE GUERRE.

IN the issue of the 21st March we referred to Lt. D. S. Baddeley, A.S.C., Croix de Guerre, as having been the former treasurer of the Motor Cycling Club. This was not so, as the post was held by his brother, Capt. L. A. Baddeley. D. S. Baddeley, however, was a well-known rider before the war, and an energetic member of the M.C.C.

* * *

CORROBORATION.

WE have received from Capt. A. R. Jordan, R.A.M.C. (France), the following letter, which may settle any doubts in the minds of those who disbelieved the remarkable story of Pte. Taylor, whose adventure we mentioned recently:

"I was interested to read in your last issue to reach us a paragraph relating to the extraordinary case of Pte. Taylor, D.C.M., of the London Regiment, who 'lay out' wounded for over six weeks last summer.

"The man was a patient under my care, and you can assure your French readers that the story is perfectly true, and if they want further details put them in communication with me.

"Taylor arrived here looking like Robinson Crusoe, with long dark hair and beard, emaciated, and with deeply sunburnt skin. He had a recently healed compound fracture of the femur, which had completely healed in the six weeks without a splint.

"He told us the story of how he had lived on dead men's rations until he could crawl, and on nothing but bully beef and water for the last fortnight, and of how his companion, who tended him during the first week when he was delirious, was ultimately captured.

"The whole thing was so incredible that it was carefully enquired into, in connection with the award, while he was here, and there is no doubt of its truth.

"I think his case deserves publicity, as we warned him at the time his adventure was so extraordinary that it would be difficult to get people to believe it."

* * *

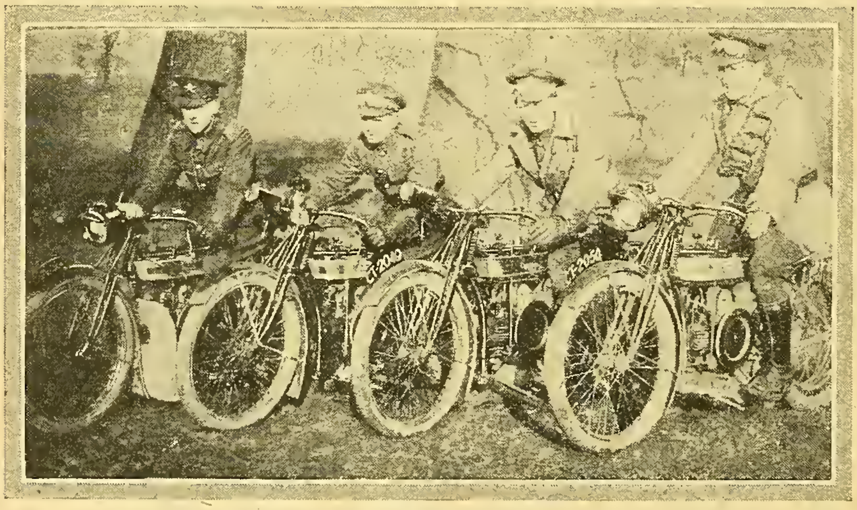
THE P. AND M. IN FRANCE.

AIR-MECH. T. P. DIXON, R.F.C., writes from France respecting the way his P. and M. stands up to its work: "It smiles at the hills, never asks to be shut off, and delights in ticking over. I am just off on a 150 km. run, and hope the little 'bus will behave itself. It is raining like anything, so please pity the poor R.F.C. D.R.'s. They are just doing their bit."

* * *

A GALLANT MOTOR CYCLIST AIRMAN.

ONE of our greatest airmen, Capt. John L. Trollope, R.F.C., has unfortunately been posted missing during the week-end. In what he describes as "the most wonderful day of my life" he created a record by destroying six enemy machines. This was on March 21st, the day that the Germans first launched their offensive against the British lines. One machine was shot to pieces, the second one went down in flames, the third was forced down into a spin and was seen to crash, the fourth exploded in mid-air and fell down in fragments, while the fifth and sixth, flying quite low down, were attacked together and both crashed. Capt. Trollope, who is only twenty years of age, was a despatch rider in France during 1915, and only took up flying in the autumn of 1916. He was an old Malvernian, and left school to join the Army.



Scouts of a M.M.G. battery mounted on Douglas motor cycles.

PROMOTION FOR AN IRISH MOTOR CYCLIST.

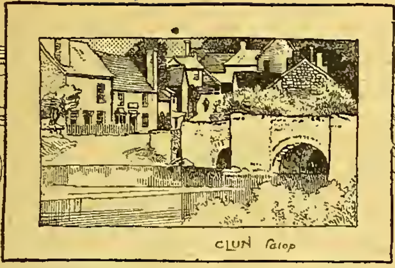
J. A. H. WATERS, one of the membe of the Dublin and District Mot Cycle Club, who has been servi on the Western Front since the ear days of the war, has been appoint major. In pre-war days, Waters was well-known figure in competition mot cycle circles in Ireland; and at Portma nock, in the speed trials on the sand and in reliability events on the road, h steered many a lightweight to victory He joined up in the early months o the war, being granted a commission i the Mechanical Transport Section of th Army Service Corps, and was appointe a captain after being about twelv months on active service. He has spen the whole of his time in France, fo the most part serving the guns wit ammunition, and in his new capacit will be the officer commanding the 33r Division M.T. Company.

Major J. A. H. Waters, A.S.C.,M.T., of the Dublin and District Motor Cycle Club.

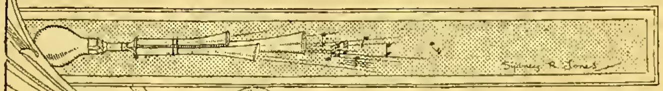
* * *

AN R.E. UNOFFICIAL BADGE.

IN an article which appeared in th issue of March 14th, entitled "Th D.R. through French Spectacles," mention was made of a badge worn b certain despatch riders, consisting of winged wheel and the initials "D.R." We are informed by the Commandant o an important R.E. Centre that the badg is not an official one, and that the wear ing of it is irregular. It is believed t have originated with certain Territoria Force Units, and the wearing of it i not universally permitted.



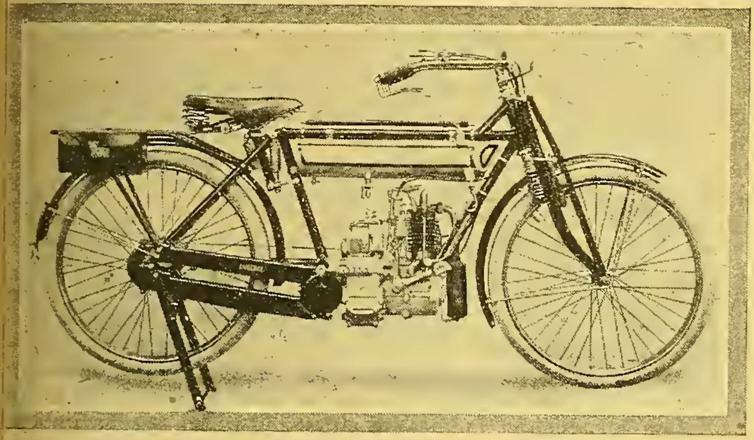
THE CHAIN GUARD.



NOTES ON A DEBATABLE SUBJECT.

SINCE it is certain that chain transmission will be almost general practice on passenger motor cycles in the immediate future, the question of hain guard design is one of paramount importance.

Many British designers have attempted to solve this roblem, and in many cases considerable success has een achieved, but there are very few owners of British hain-driven machines who claim that the chain guard s everything that can be desired. Concerning merican machines, we hear fewer complaints on this core, for the very good reason that the Americans o not appear to have attempted to enclose the chains ompletely.



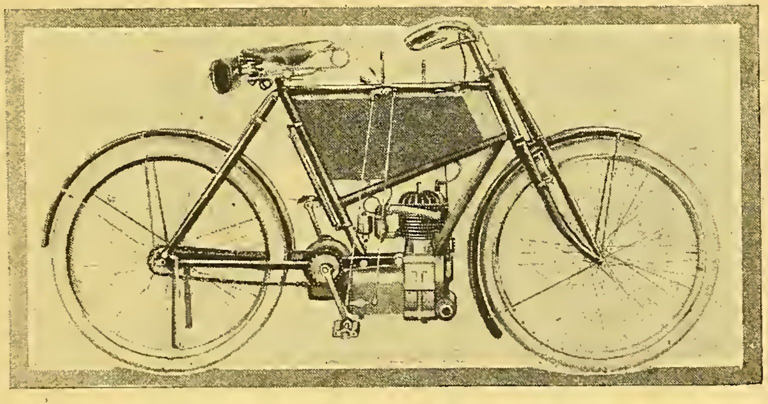
The Arielette lightweight of 1910, a design in advance of its time. Note the neat chain case, which was of aluminium.

From a mechanical point of view it is highly esirable that the chains be protected from mud, rit, and rain. To run a chain exposed is deliberate estruction of a very delicate and accurate iece of mechanism. One has only to ealise what even a small fraction of an nch wear at all the points of contact neans to appreciate this. If one examines link of chain or the parts thereof it ecomes apparent how easy it is for dust o wear the many bearing surfaces. The hain guard, therefore, is very important, nd deserves more attention from the designer, who, in many cases, appears to ave left the problem to the tinsmith.

It occurs to the writer that one solution of the problem is so to design the machine that the necessity for the chain to cross the chain stay of the frame is eliminated. One has only to examine a machine like the American Henderson to see how simple it would be to fit an oil bath chain case to this machine if the clearances permitted it. Hence the necessity to consider the chain case as part of the design, and not as an after-thought in the same category as the saddle and the carrier.

Probably the neatest chain casing I have seen was the method employed by an American cycle car concern. The chains were enclosed in cork-lined tubes, which connected two circular boxes containing the sprockets. One cannot imagine the system being very durable, however, but there appears to be no reason why chain cases should not be kept as small as possible. If sprockets of equal size were used this could be done quite easily; but, of course, all the gear reduction would have to be made in the primary drive. This would be an advantage in other directions. In the first place the rear chain would be working at a lower speed, and, secondly, it would assist designers to overcome transmission troubles connected with spring frames. A slower rear chain would be more silent, but since most of the chain noises emanate from the first chain, this advantage would not be so apparent unless the primary drive were by shaft or by silent chain running in a well-made oil bath case. The guarding of the front chain is not a difficult matter, and eventually we may have the engine and gear box as a combined unit.

The small rear chain case also has the advantage of a neater appearance, as will be seen from one of the illustrations reproduced here. Incidentally, the Arielette design is one of the most interesting little machines introduced to the wheel world. It embodies a three-speed epicyclic gear unit integral with the



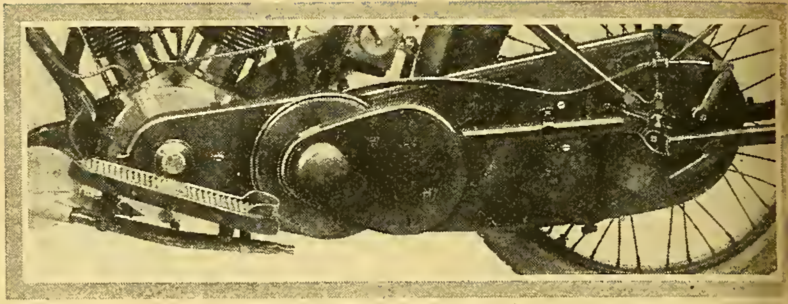
A 1904 Swift with 1-1 chain ratio, the prototype of the Arielette.

The Chain Guard.—

engine, and resembles, in many ways, the little Swift of 1904.

The large chain guard, to be successful, must be made from much heavier metal than a smaller one, while an aluminium casting probably is the best for both small and large cases. The case on the Arielette comes nearest to the tubular chain guard to which I refer, and it shows that the value of the small case was appreciated by the early advocates of chain drive.

VEDETTE.



A modern chain case arrangement.

Research Association of Cycle & Motor Cycle Trades

The Point of View of the Cycle and Motor Cycle Manufacturers' and Traders' Union.

IN recent issues we dealt editorially with the Government scheme for the encouragement of industrial research. Briefly, the Government have set aside a million pounds for that purpose, and each industry is entitled to apply for financial assistance the extent of which, we understand, will be determined by the amount of money the industry itself is prepared to expend. The Trade would have control of its own Research Association subject to a certain degree of Government supervision.

A Research Association for the Cycle and Motor Cycle Trades is in process of formation by the Cycle and Motor Cycle Manufacturers' and Traders' Union, Ltd. The Union has voted from its accumulated funds the sum of £2,500, and has appealed with some degree of success to its 250 members for subscriptions and donations. The Union has had the matter in hand for the last twelve months, and the time has now arrived for the scheme to be definitely shaped.

In the meanwhile, the motor car trade has a Research Association in contemplation, and discussion naturally arises as to whether a joint association of the cycle, motor cycle, and motor car trades would best meet the situation. However, while the interests of the two industries are the same up to a point, that point is soon reached, and is, in fact, passed before the important item of frame design is considered.

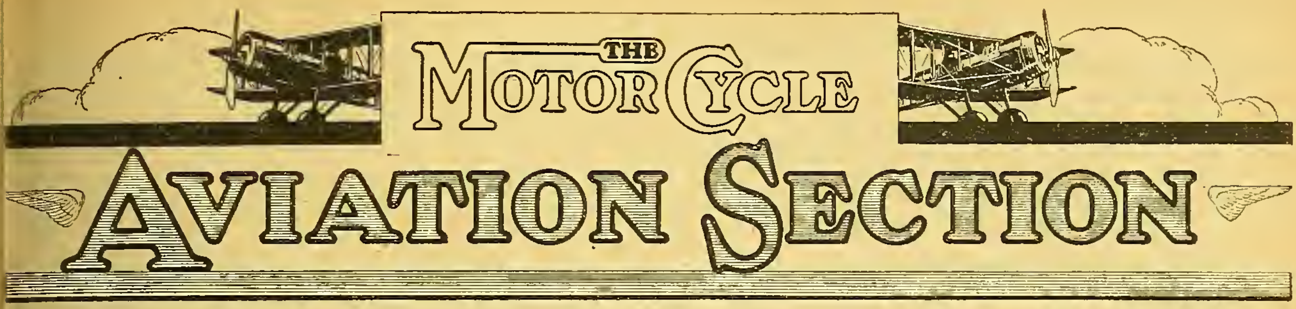
The Union has tentatively made quite satisfactory arrangements to co-operate with the Birmingham University, and the prevailing opinion is that the Union can better serve the purpose of its particular interests by adhering to those arrangements than by co-operation with the motor car trades.

We understand that Sir Oliver Lodge, the Princip of the University, is prepared on certain conditio to place the vast resources of the University at th services of motor cycle research investigators. Mor over, co-ordination with the Birmingham Universit carries with it immediate use of laboratories ar equipment, as well as trained investigators in eve branch of engineering, which in the case of a separa association would take years to establish, and whe established could only be maintained at enormou cost. The offer by the Birmingham University t place its engineering resources at the service of cyc and motor cycle research seems to be too good to l neglected, and it has the further advantage that r difference of opinion can arise as to the direction investigation, which might easily happen if the interes of two trades were attempted in the one institution.

We learn that certain members of the Union, bo firms and individuals, have not yet shown any pra tical interest in the scheme, but we are confident believing this is due to their not having given th matter consideration. Surely, by this time there no one, either directly or indirectly, interested in tl industry who does not recognise the imperative nece sity for the closest scientific research to be applied the improvement of the motor cycle, and inasmuch the cost of such research work cannot be undertak without the united support of the whole trade, we a hoping that every motor cycle manufacturer, comp nent, and accessory and tyre manufacturer will cor forward with his membership subscription and don tion without delay and so take his share in an unde taking likely to have such far-reaching consequence

INITIATING THE NOVICE.

THE Rochester (U.S.A.) agents for Harley-Davidson motor cycles have hit upon a useful plan to popularise motor cycling. During the riding season they have a school open to all who ride and intend to ride motor cycles. Last year the classes were attended by an average of a hundred riders, and grew more popular every week. One evening is devoted to each of the important parts of a motor cycle, such as the carburetter, magneto, transmission, etc., etc., and, provided the lectures were not too technical and also not too elementary, we think such classes would be very popular in this country. One gentleman our acquaintance, who is interested in the boy sc movement, is utilising his idle light car and stud motor cycles to teach an automobile class of b scouts, and no doubt much good will come of efforts. We have also heard of a motorist scho master who holds a weekly evening class on mo mechanics which is very popular with his pupils, whi prior to the war, a North of England motor ag built a special "club" room adjacent to his gara where was held a weekly round table conference.



THE MOTOR CYCLE AVIATION SECTION

The enormous importance of the Air Service needs no emphasis: it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouraging of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

Ten Years Ago.

On December 31st, 1908, Wilbur Wright flew 77½ miles in 2h. 20m. 23s. at Le Mans, France.

◆

3½ h.p. Aeroplanes.

According to an authority on aviation, there seems no valid reason why flight should not ultimately be achieved with a 3 h.p. or 4 h.p. engine.

◆

A Scotch Aviator in Russia.

Mr. Chessborough J. H. Mackenzie Kennedy is a Scotchman better known in Russia than in the land of his birth. To him the development of the aeroplane in Russia was largely due. The last ten years of his life are a romance which should make more than one chapter in the history of aviation when it comes to be written. In Russia Mr. Kennedy was known as the "Jeweller of Aviation," and was a close friend of the famous Sikorsky.

Box Kites.

The box kite was invented thousands of years ago by the Chinese.

◆

The Prototype of the Zeppelin.

In the late eighties, Capt. Kostovitch, of the Russian merchant marine service, built a rigid dirigible, which may be regarded as the prototype of the Zeppelin. Count Zeppelin unquestionably was aware of Kostovitch's experiments when he began the construction of his own gigantic airships.

◆

P. and M.'s and Douglases.

The Royal Air Force is gradually making itself felt in many little ways if not in big ones. For instance, three P. and M.'s recently arrived at the garage of a big R.N.A.S. airship station in the North, and we all know that up till now P. and M.'s had been used exclusively by the R.F.C., the R.N.A.S. favouring the Douglas.

The First Cross-Channel Flight.

Monsieur L. Blériot flew from Calais to Dover on July 25th, 1909.

◆

The First to Loop the Loop.

Kostin, a Russian, was the first airman to loop the loop. Kostin used a Henry Farman machine, and the attempt was made without design. He was trying the machine, when he was struck by a side gust of wind, which would certainly have turned him over had he not been an expert flying man. To escape disaster he made a "false loop," and finding that the machine could fly in that position, he twice repeated the same manœuvre, in which the machine was so nearly upside down that the aviator was sprinkled with petrol. This happened several months before the famous Frenchman, Pegoud, startled the world with his exhibition flying. How many discoveries of this type have not been due in some measure to accident.

THE ROYAL AIR FORCE: OPENING FOR BOYS.

THE Royal Air Force will be open to receive boys from time to time, for long service only, between the ages of fifteen and seventeen years.

PERIOD.

(*a*) Eight years with the Colours, including period served prior to attaining the age of eighteen years, and four years on the Reserve.

(*b*) Six months before the termination of eight years' service with the Colours they may, if recommended by their Commanding Officer and Air Ministry authority is given, re-engage to complete their Colour Service to qualify for pension.

RATE OF PAY.

1s. per diem with free kit, food, etc., and war pay at 1d. a day for each year of service rendered during the war, subject to good conduct. On attaining the age of eighteen years boys will be appointed third-class air mechanics at 2s. per diem.

TECHNICAL TRAINING.

Boys will have an opportunity of learning a trade, which should be useful to them on their discharge.

All boys have to attend Divine Service at least once each week.

Boys are housed together under specially-selected disciplinary non-commissioned officers.

The regular working hours for boys do not exceed forty-eight hours per week. In the case of boys under seventeen they do not exceed forty hours per week.

Systematic arrangements are made for the boys' education, recreation, and amusements

MEDICAL CLASSIFICATION

Grade 1 only.

Applications for enlistment should be made by letter, stating full particulars, including trade (if any). The following certificates will be required:

1. Written consent of parents or guardians, duly witnessed.
2. Certificate of good moral character from clergyman.
3. Certificate of birth.
4. Certificate of schoolmaster of having passed Standard VI., or equivalent.

Applications should be made to the Royal Air Force Reception Depôt nearest to the residence or place of registration of the applicant.

Applicants must be natural born British subjects and the sons of natural born British subjects.

FLYING FACTS AND THEORIES.

CONTROL. (I) CLIMBING.

By W. G. Aston, A.M.I.A.E.

THE climbing abilities of an aeroplane depend directly upon the excess of power which the engine possesses over and above that which is required to sustain the machine in normal horizontal flight. Generally speaking, climb is quite independent of such control as is effected by moving subsidiary planes, and is dictated by throttle opening only. In fig. 1 a horizontal flight path of a machine is represented by the line AB. In these circumstances we will suppose that 60 h.p. is required from a motor which is capable of 100 h.p., and that the speed is 60 m.p.h. Now if the motor is opened out to its full capacity and the setting of the tail planes not altered, the immediate effect will be—first an increase in speed due to the enhanced thrust that has become available, and secondly, an increase in altitude due to the fact that, keeping the angle of incidence constant, more air is accelerated downwards in a unit of time, and therefore there is an increase in the lift force. Whilst flying level with 60 h.p. the lift is exactly equal and opposite to the weight of the aeroplane; with the extra speed provided by the addition of 40 h.p. the lift is greater than the weight, and therefore the machine climbs along the path indicated as AC. If still more power were available it would follow the still more sharply inclined upward path AD.

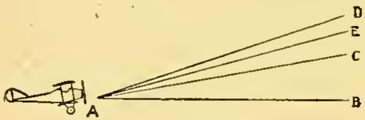


Fig. 1.

Now, as I have before pointed out in these articles, kinetic energy can always be transformed into potential; in other words, speed can be exchanged for height. Since the original speed has been increased, it follows that by dropping this extra velocity more power will be released for climbing purposes. This is effected by means of the elevator control. The pilot increases the angle of attack of the main planes by negatively inclining his elevator, with the result that more air is dealt with by them, and the speed is reduced once more to 60 m.p.h. Since for this speed 60 h.p. only was required for horizontal flight, it follows that 40 h.p. is available for direct lift, and in these circumstances the climb, that is to say the maximum climb, will be along the line AE, on the assumption that the original 60 h.p. represents the minimum power required for horizontal flight. If such minimum power is less, then there is more power still that can be applied to the acquisition of altitude.

The Best Climbing Speed.

It needs to be pointed out that like most broad generalities this statement is only more or less true, and needs to be qualified by the fact that, although in the greater number of aeroplanes the best climbing speed is round and about the minimum speed of the machine, it does not follow that such is necessarily always the case, owing to the fact that since the angle of incidence has been changed, the ratio of lift to drag has also changed. This sometimes leads to the result that the best climbing speed is a little higher than the minimum horizontal flying speed, but it is only rarely that there is a big discrepancy between these figures, though it is more likely to occur when the design has been laid out primarily for the object of providing the best performance at a big altitude rather than near the ground.

Returning to the hypothetical aeroplane, already dealt with, it is easy, knowing these figures, to calculate what the climb will be. If 60 h.p. only is required for flying level, 40 h.p. is available for direct lift. If the machine weighs 2,000 lb. the climb will be at the rate of $40 \times 550 \div 2{,}000$ feet per second —*i.e.*, 11 feet per second, or 660 feet per minute. This, however, will only be the case whilst the engine is giving full power.

As I showed in a previous article, power falls off as altitude is increased, hence the rate of climb also falls off, until when the aeroplane reaches its ceiling all the power of the engine is used up in horizontal flight. Adequately to compare two aeroplanes in point of rate of climb, one must know the altitudes at which these climbs have been measured.

"Zooming."

Climbing must by no means be confounded with "zooming." In the former a regular speed is kept up, and, so long as the engine provides the necessary excess power, a regular rate of climb will also be possible (neglecting altitude influence). In zooming the excess of *speed* which the machine has over an above its minimum is transformed into height b means of the elevator control. If the aeroplane i racing along "all out," at, say, 100 m.p.h., it ca be zoomed up at a very steep angle indeed, until it lying Facts and Theories.—

peed falls to the supposed minimum of 60 m.p.h., fter which it must be flattened out, or else it will imply stall for lack of support. The difference etween zooming and climbing is shown graphically figs. 2 and 3 respectively. As far as a straight comparison is concerned, it will readily be seen that, if the machine starts from and attains the same respective altitudes at the same speed in each case, the zooming method ains nothing over the direct climb, though, needless say, zooming is a most valuable manœuvre for other urposes.

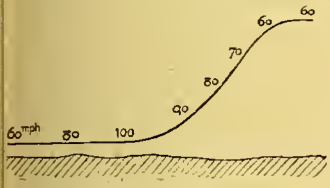


Fig. 2.

It will also be perceived that, in order to get the est climbing performance out of an aeroplane, the ir speed indicator furnishes a very useful finger post, lthough it is not strictly necessary, as a practised ilot will tell from the feel of the controls more or ss what he is doing, and he will also gain knowdge from a glance at the dial of the barometer, over hich he will seek to keep the indicating hand steadily oving. Generally speaking, however, it will pay im to retain a practically constant air speed, which, f course, will be a little higher than stalling speed.

A great many aeroplanes are provided with a trimming gear, which is brought into action for climbing purposes, and in this case the pilot will be able to adjust his "fixed" tail plane to a definite setting at which the best climb is got. He can then keep the joy-stick in a central position until it is required for manœuvring purposes. The trimming gear is, in fine, simply a device for relieving the pilot of a certain amount of fatigue, and enabling him to keep the incidence of the main planes set at an angle appropriate either to speed or climb as circumstances require.

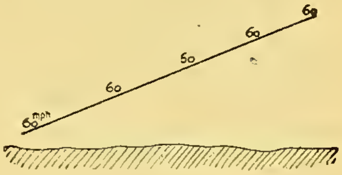
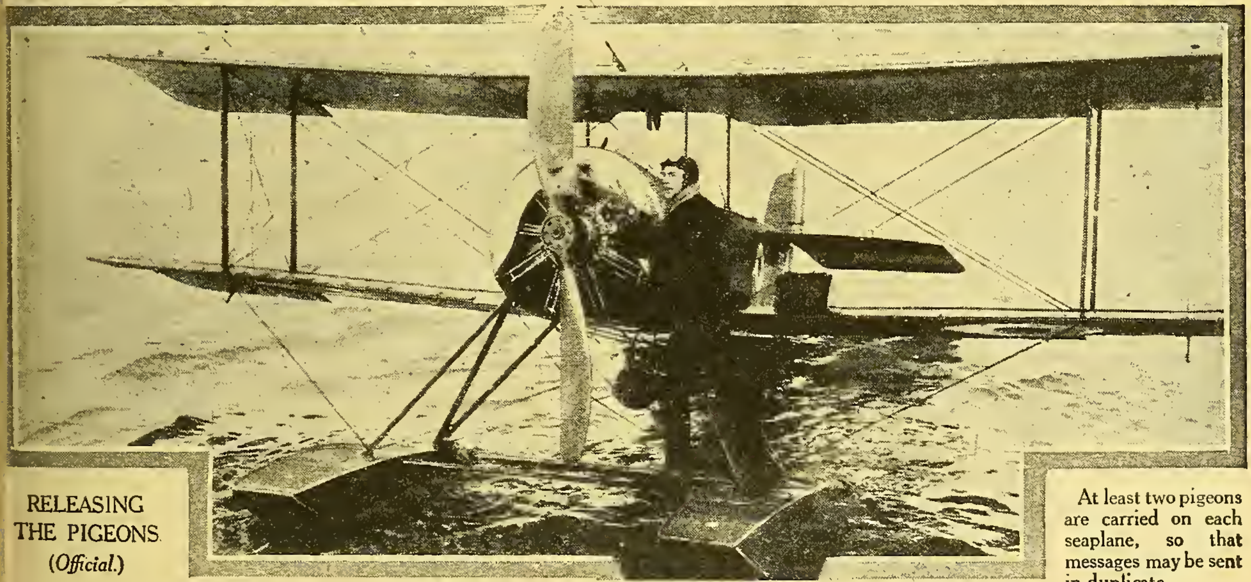


Fig. 3.

As the angle of climb becomes steeper it follows that a greater and greater proportion of the weight of the machine is borne directly by the air screw; thus if the climb were vertical the machine would cease to be an aeroplane, and become, to all intents and purposes, a helicopter. As far as I know, no make of machine yet produced has managed to climb quite perpendicularly, but there is no reason why in the comparatively near future this should not be done, even if it were not possible to make engines lighter in weight per h.p. than some examples are at the present time.

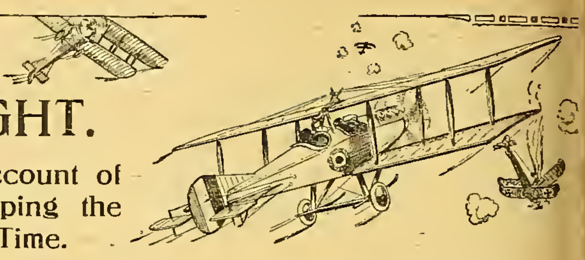


RELEASING THE PIGEONS. (*Official.*)

At least two pigeons are carried on each seaplane, so that messages may be sent in duplicate.

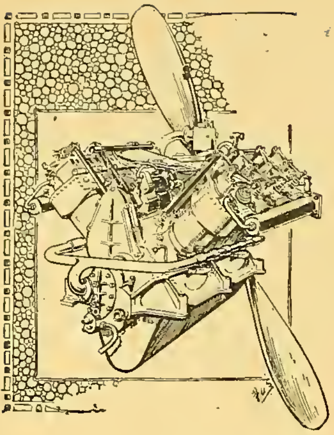
RAILWAYS, AEROPLANES, AND COLONIES.

THE main obstacle to the opening up of rich countries Overseas is the cost of railways. Colonists are impaled on a dilemma. They annot develop big markets without a railway: and a ailway cannot pay until an enormous amount of prouce and passenger traffic is assured. Even in comaratively easy districts, where labour is cheap and either rivers nor mountain ranges present serious bstacles to the track layers, a railway demands an outlay of over £20,000 per mile. Roads are about 75% less expensive, but must be capitalised at about £5,000 per mile. An aeroplane service, allowing for three trips per diem in each direction, and using machinery capable of carrying threequarters of a ton, costs about £600 per mile. It is clear that many of the "new" countries will enjoy good aeroplane services long before they can hope for extensive road or railway systems. Already plans for rapid postal service to countries difficult of access have been organised.



MY FIRST FLIGHT.

A Motor Cyclist's Account of the Sensation of Looping the Loop for the First Time.



THE roar of the big 160 h.p. engine died down into a confidential mutter, and the mechanics stood by ready to pull the chocks away from under the wheels of the towering military biplane as the pilot (one of our best known civilian testers) motioned me to my seat.

I scrambled inexpertly into the comfortable cockpit, buckled the broad safety belt about me, drew down my goggles over my motor cycling helmet, and waved to show that I was ready.

The sombre drone of our eight massive cylinders swelled again, and we moved forward bumpily, gathering speed momentarily. Across the green field we sped, and I clung to the padded arms of my seat as we rocked about. Nearer and nearer we drew to the boundary fence, until, just as it seemed we could never clear it, an abrupt cessation of vibration and a queer sense of detachment told me that we had left the ground.

With the nose of the machine well up, we soared steadily into space. An occasional lurch into an air pocket was the only interruption of the incredible smoothness of our going—not even a highly tuned twin on smoothest asphalt can compare with the velvety feel of the third dimension.

I looked down over one veering wing as we banked, and below me lay the whole countryside, arcadian and wooded, and the corrugated roofs of the hangars we had left glinted in the sunlight. Our shadow chased us, black and phantom-like, across the fields below. Far away lay the smoke-pall of London. The steady diapason of the engine throbbed in my ear drums, and we turned, as it seemed, with immense deliberation. Sense of speed there was none.

I turned to look at my pilot. He grinned through the oil splashes which covered his face (the mechanics had been very generous in the matter of lubrication with our brand new engine) and indicated by sign that we were doing ninety-eight miles an hour. Incredible!

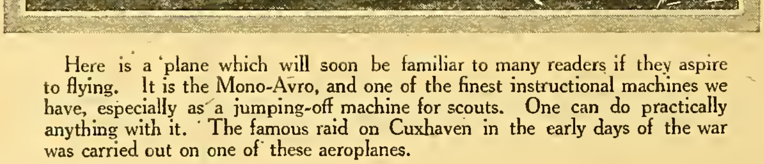
We swung about like some great gull, and then tl blurred confusion of sound hardened, and we sh upwards once more. The trees shrank to little tuf of green, and a village below us turned to tiny patch of mosaic, red and white.

I became dimly conscious that somebody wished attract my attention, and turned to see the pilot, h mouth wide open, evidently bawling at me.

He winked a goggled eye, and twirled one finge Evidently this was an invitation to loop. I nodd vehemently, and hardly had I done so when the engi shut off abruptly, so that the silence almost stunne and for the moment we seemed to poise—and th down, down, unutterably swift and steep, hurtli straight to the earth, with the wind wailing throu the wires, that lashed like the rigging of a shi Suddenly I became aware of an undue pressure on n feet, then felt the uncanny lightness that may l experienced in mountain air—hardly had time grasp the astonishing spectacle of the sun burni beneath me, and we were out of the loop, and tl slackened wires tautened again, and once more tl engine took up its monotonous refrain.

I turned round to smile appreciation. It was rath a breath-taking business, but it gave me a glimpse that queer feeling of indifference to the possible ou come that must go with the sense of high adventu possessed by those men of ours who outfly, outfigh and outmanœuvre the German at every move of th game, given only a decent machine to do it on. is not only one's body that leaves the earth: I will n attempt psycho logical analysi but there is a quee feeling of exaltatio akin to that exper enced when har after big game, an "all-out blind on a straight roa that must be felt be appreciated, an I think, must the keenest joy living.

Now we turne down, eddying lik a leaf, watching th flags round th aerodrome for wind direction; and then straightene into one long, glorious glide, coasting down the a lane silently, save for the fanning of the propelle till abruptly we straighten out—a few premonito bumps, and then the bouncing of the sturdy unde carriage as we "taxi" in. R. H. BRITTAIN.



Here is a 'plane which will soon be familiar to many readers if they aspire to flying. It is the Mono-Avro, and one of the finest instructional machines we have, especially as a jumping-off machine for scouts. One can do practically anything with it. The famous raid on Cuxhaven in the early days of the war was carried out on one of these aeroplanes.

Motorists

The "quietness" may not have pleased everybody. Reason and consideration may here and there have been mistaken for apathy. The Executive will, however, stand firmly by its programme, confident that the A.A.'s determination to assist and not to embarrass the Government during the War, has the sympathy of every reasonable motorist.

A gravely depleted staff is "carrying on." No complaint has been received from any member of inattention to a single one of the innumerable calls on the Association's resources, no matter how vital or how trivial the subject matter of such call.

The A.A. is first and last a Fighting Organisation. It was born and built up in the midst of war—war against the *unreasonable* treatment of reasonable motorists.

The A.A. has never shirked a fight. Its wonderful progress, 92,375 individual members in 8 years 11 months (August 28th, 1905, to June 30th, 1914) was achieved not merely because it fights, but because it always fights for the right thing at the right time.

The A.A. is fighting now—for the Country.

It is organised and ready to fight harder than ever for the redress of any motoring grievance on the first day when it seems *fair* to fight.

No reasonable motorist can say that that has yet arrived, or that it is fair to harass the Authorities and to distract their efforts from the more vital needs of the Nation.

To be reasonable now will ensure more power to our fighting machine when the World's War ceases and the Motorists' War is resumed.

The Peace Aims

of the A.A. include:

a. The re-application of Motorists' Millions to their original object, viz., Road maintenance and improvement.

b. Employment of Armies on Road Construction during demobilisation.

c. Continuance of all War Gas-washing Plants for Benzol, thereby adding many million gallons of Motor Spirit per annum to pre-war home production.

d. Vigorous encouragement of Home-produced Fuels and State regulation of prices to the user.

e. Complete Sign-Posting of the British Isles on National lines.

f. Drastic revision and consolidation of Motor Laws and abolition of all tolls.

When the time arrives to achieve these Aims, the A.A. will reap the fruits of its consistent patriotism, economy, care for the dependents of all its "serving" employés, prevision, and reasonableness. The A.A. will have—

1. A strong fighting programme.
2. A "Motorists' War" Fund of six figures.
3. An efficient staff of loyal workers.
4. The well-earned sympathy of all Government Departments.

It is beyond doubt that this healthy condition is attributable to a clear appreciation at the outset of the Country's grave needs, to loyalty, to watchfulness and quiet—but not any the less efficient—protection of all reasonable motorists.

By Order of the Executive Committee.

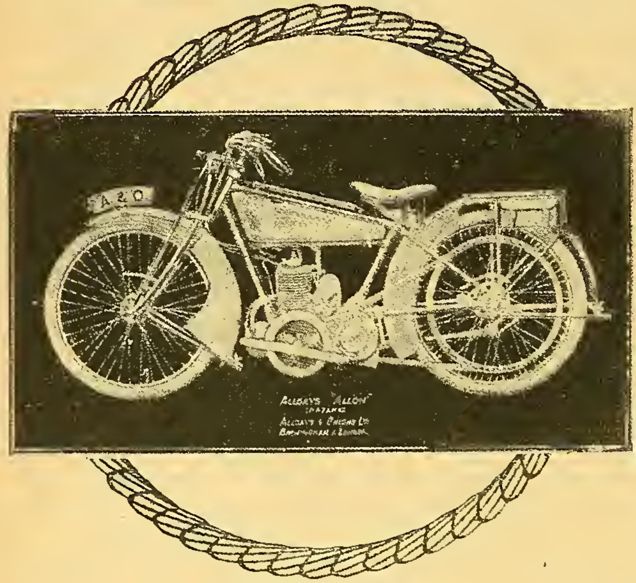
Stenson Cooke, *Secretary.*

(April, 1918.)

The Automobile Association & Motor Union,
Fanum House, Whitcomb Street, London, W.C.2.
And at Glasgow, Edinburgh, Manchester, Liverpool, Leeds, **Birmingham, Bristol,**
Exeter, Plymouth, Cardiff, Swansea, Norwich Dublin, **Belfast, Cork, Paris, Nice.**

In answering this advertisement it is desirable to mention "The Motor Cycle."

THE MOTOR CYCLE.



TWO-STROKE
(PATENTED).

For Medical Men, Farmers, and all those engaged on Work of National Importance, this Machine is offered as being
——The Best——
for Reliability, Comfort, and Economy.

Alldays Allon

ALLDAYS & ONIONS PNEUMATIC ENGINEERING CO., Ltd.,
Matchless Works - - - - BIRMINGHAM,
and at 58, Holborn Viaduct, E.C.1.

APPLICATIONS ARE INVITED FOR POST-WAR AGENCIES.

MOTOR CYCLES
& how to manage them.

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Carefully revised and brought up to date. New material added where necessary. Chapters on magneto ignition, lubrication, etc., extended to include all recent developments.

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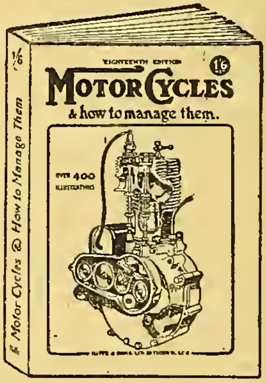

¶ The comprehensive nature of this book commends it to every motor cyclist, whatever his experience and whatever his type of mount.

¶ Service riders will find it an invaluable companion and guide

¶ Nearly a quarter of a million copies have already been sold.

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.·. .·. .·. And all leading booksellers. .·. .·. .·.

The U.S.A. Standard Motor Cycle Engine.

Particulars of the Engine designed for the American Army Motor Cycle.

WE have already announced that the American Army is to be supplied with a standard motor cycle for use ir he war zone, and we are now able to gi some particulars of the engine of th machine, although at present details of he machine itself are not available.

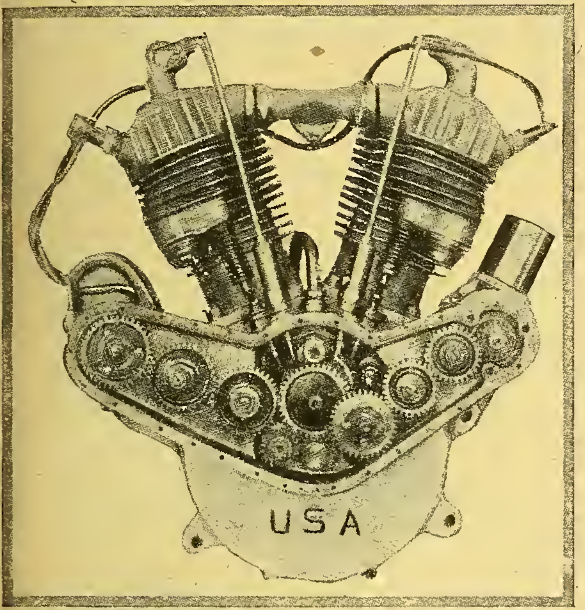


Fig. 1.—The U.S.A. standard motor cycle engine with gear cover removed. The bore and stroke are 84·5 × 89 mm. = 996·5 c.c.

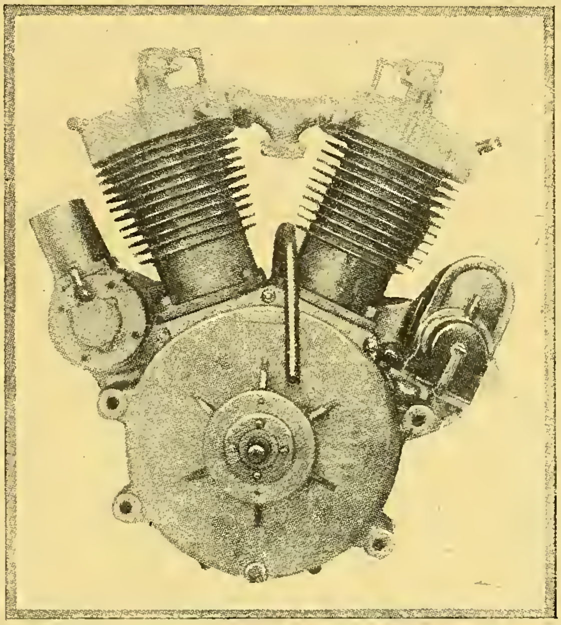


Fig. 2.—The driving side of the U.S.A. standard engine, showing generator and magneto mountings, the brackets of which are cast integral with the crank case.

A 90% of the motor cycles are to be us fitted with sidecars, the compression ra of the engine is much lower than th usually employed, and is, in fact, 3 to 1.

Crank Case Details.

he engine is of the twin-cylinder V ty, the angle of the cylinders being 45 and the bore and stroke $3\frac{5}{16}$in. × $3\frac{1}{2}$in. =.5×89 mm., giving a capacity of 6 4 cu. in.=996.5 c.c. Looking at the il trations of the engine, the m striking feature is the provi n for the magneto and the li ting dynamo. The brackets for the two fittings are cast integral w the crank case, so that both the fittings are an essential fe ure of the engine design. A ther departure from usual A erican practice is made in that th crank case forms a part of the cy e frame, as in normal English p tice. The valves are overhead in ts, placed in cages above the ex usts, and all valve springs are er osed.

Lubrication.

ubrication is, of course, of the m hanically-operated oil pump ty e. The plunger pump is positi ly driven, and the valve in the p p is a rotary; thus the troubles often occurring with the ball and check valve type of pump are avoided. A supplementary hand pump is, of course, fitted. The crank case release valve strikes a somewhat unusual departure, in that it is a rotary valve mechanically operated, and consequently does not rely on crank case compression or suction for its working. This valve is so timed that there is always a slight amount of suction in the crank case, and it is claimed that this will tend to ensure that the exterior of the crank case will be free from superfluous oil.

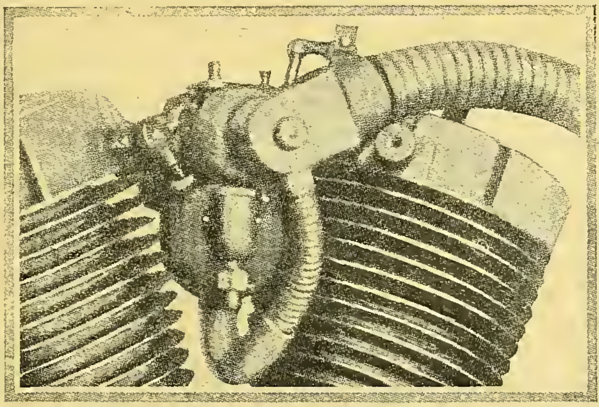


Fig. 3.—A carburetter that may be adopted for the U.S.A. motor cycle engine.

Carburation.

The carburetter is not yet definitely decided upon, but it is understood that one at present in common use on most motor cycles will be fitted, and will be supplemented by the fitting of an air strainer to the carburetter itself.

Power Output.

The power output of the engine is 15.3 h.p. at 2,900 r.p.m., which, of course, is nothing exceptional, as the engine is deliberately designed not to give excessive power but to be able to maintain its output under gruelling and difficult conditions. Further experiments are being carried out, and it is anticipated that some minor alterations to the engine may be made, but these will not be made with the intention of actually increasing the power output, for in a machine that is to be used under rough conditions the highest efficiency is not necessarily an essential.

The Lighting Dynamo.

The lighting arrangements contain the germs of novelty, in that the dynamo itself runs at twice engine speed, and, although it is driven directly from the timing gear by worm gearing, it may be disconnected during the day time so that excessive wear may be avoided.

This disconnecting arrangement is ingeniously constructed so as to prevent the engagement of the dynamo, either deliberately or by accident, while the engine is running; consequently the risk of a careless driver's ruining the dynamo and its drive by suddenly engaging the dog clutches while riding the machine or while the engine is running, with the object of saving a little time, is prevented.

Letters to the Editor

The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

THE CASE FOR THE LONG STROKE.

Sir,—Replying to the article of Mr. Alex. Lindsay, M.B., the "Case for the Long Stroke," in your issue of the 28th March, as to the bore and stroke of the 500 c.c. racing M.A.G., I am pleased to give the information for which he asks, which is 64×77 mm., and of the 7-9 h.p. or 1,000 c.c. engine 82×94 mm.

OSBORNE DE LISSA, Director,
THE M.A.G. ENGINE CO., LTD.

ARMY SIDECAR DRIVERS.

Sir,—If Mr. P. Thurston is so keen to drive a motor car let him join the Heavy Branch, and drive a Tank. We are awfully sorry that he cannot get into the A.S.C., M.T., "notwithstanding that his father has served two years with this corps." We are sure that he is not looking for a "cushy" job. He must have overlooked the Tank Corps. There is plenty of scope for his experience there.

G. A. KING.
Tank Corps, B.E.F. H. DOMINY.

A RALEIGH FOUR-SPEED FLAT TWIN?

Sir,—With reference to the prediction in your issue of April 11th that the Raleigh will market a post-war motor bicycle with flat twin engine and four-speed gear, we should like to point out that we have no intention of doing this. It is true that we have patented a four-speed gear box, but any motor bicycle we put on the market will incorporate the Sturmey-Archer *three-speed* countershaft gear, which has been so well proven on despatch riders' machines during the war.

We shall be glad if you will therefore correct the wrong impression which has been created regarding the gear box.

THE RALEIGH CYCLE CO., LTD.,
Harold Bowden, Managing Director.

SIDECAR ALIGNMENT.

Sir,—Articles have appeared in *The Motor Cycle* from time to time on the design, mechanism, alignment, etc., of the sidecar chassis, alone and in combination. In all of them a most important factor has been consistently ignored, viz., the fact that more often than not the vehicle is moving not upon a level surface, but on one which slopes down from right to left. Deplorable results of this ignoring of the camber of roads are frequently seen. Many of your readers will agree with me that nineteen out of twenty combinations have many of the following characteristics: (1.) The sidecar wheel inclines inwards. (2.) The bicycle leans towards the sidecar. (3.) The body of the sidecar is nearer to the left C spring than to the right. (4.) All three tyres are worn more on the inside than on the outside, the front tyre especially so. (5.) The saddle is more easily depressed on the left than on the right-hand side, with consequent discomfort in riding. (6.) The chassis is bent laterally, being lower at the middle than at the sides. (7.) The springs on the left of the body have acquired a permanent "set," with the result that the body is tilted even in relation to its own chassis.

In driving such a machine excessive side-drag is felt, especially when turning a right-hand corner while driving on the left side of the road.

One combination I remember—a new 6 h.p. machine—was only three weeks on the road when the coachwork of the near side of the body was ruined by being thrown against the upper part of the C spring. On another machine I once overtook on the road, the coach body was in contact with the mudguard. Both these combinations were complete integral outfits by well-known makers. And how many outfits one meets in which the driver apparently has his left leg trapped between the tank and the sidecar?

A sidecar I once possessed had its left C spring deformed to such an extent that I had to place wooden blocks 1½in deep between the spring and the chassis.

These defects may be removed, or at least minimised, very simply by either fitting a 28in. wheel to the sidecar or coupling the axle tube of the chassis to the cycle by means of an adjustable coupling. Those riders who have a Montgomery, A.J.S., or Phœnix sidecar (there may be others) will be able to make a suitable adjustment merely by the use of a spanner. The axle tube should be dropped one inch below the hub of the driving wheel. A convenient way of doing this is to put the cycle on a one-inch plank, and then attach the sidecar in the usual way.

I have even found it necessary to have the cycle sloping a little away from the sidecar at first, say, a quarter of an inch out of parallel at the top of the tank. The stresses set up in the couplings in turning a right-hand corner on the left camber of the road are so great that in the course of a run of a hundred miles it will probably be found that the quarter of an inch divergence has disappeared, and that the sidecar wheel is truly parallel with the cycle wheels.

The only drawback of this arrangement is that a little more care must be exercised in driving on the right-hand side of the road. Also it could not be used in the case of a featherweight sidecar

Most roads nowadays have a double row of pot-holes in the wheel tracks. A combination in which the sidecar wheel is one inch below the cycle wheels may be driven on the smooth ground on each side of the left-hand wheel track and still be nearly vertical, in spite of the camber of the road.

Finally, no chassis and no couplings ever made will withstand the additional centrifugal force of a right-hand turn with a pillion passenger. A. L. GRAY.

THE HORIZONTAL COUPLE.

Sir,—After reading "Wharfedale's" article in *The Motor Cycle* of April 11th, I find myself a little at a loss to know what is the origin of the couple in the flat twin. I had always understood that it was due to the inertia of the reciprocating parts, and your contributor himself seems to lean towards this view in the latter part of the article. In the first part, however, he gives me the impression that it is connected in some manner with the explosion pressure on the pistons. If "Wharfedale" holds the latter view I am somewhat surprised; but I cannot think otherwise when he writes of "the forces applied from the cylinders" and states that the couple is anti-clockwise. If he held the usual theory he would surely realise that the couple is constantly changing in magnitude, and reverses its direction each time the pistons pass the point of maximum velocity. Moreover, he shows a diagram to prove that there is no couple in the vertical twin. This, of course, is perfectly correct if the cranks are together; but the accepted form has the cranks at 180°, in which case there is a very bad couple indeed. The Scott is a case in point. I shall be interested to know whether "Wharfedale" has discovered a new theory of balancing, or whether he is merely a trifle hazy in his notions on the subject. BOB-WEIGHT.

Kenilworth.

A PLEA FOR HIGHER GEARS.

Sir,—I notice that a correspondent in *The Motor Cycle* of March 28th puts forward a plea for lower gears. May I put forward a plea for *higher* gears?

In my opinion, a low-geared motor cycle is an abomination I exclude "flat" twins, as I have had no extensive experience of these). When on the open road I think there is nothing more exhilarating than to spin along with the engine just turning over comfortably. I have had experience of ightweights, singles, V twins, and a four, and find that a high gear is far pleasanter in every case. My last 'bus, a 7-9 h.p. twin, was geared $3\frac{1}{4}$ to 1, and on the road it was 'priceless.'' I have yet to find a two-stroke that could fire as evenly as that bicycle did.

After the war I sincerely hope that some first-class British manufacturer will produce an 8-10 h.p. four-cylinder motor cycle that will be suitable for solo use. If it were geared about 3 to 1 on top I can imagine nothing better.

Wood Green. FOUR CRAZY.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—We, the motor cyclists of the 190 and 192 N.T. Squadrons, heartily endorse the remarks made by "Old Reader" and "Air Mechanics" in your valuable and echnical journal on April 4th.

The matter of pay and promotion, although of some mportance, is outdone by the degradation of being called 'non-technical privates," and not being allowed to keep he honourable title of (air) mechanics, in spite of the fact hat we do all our own repairs and adjustments, and that ach one of us thoroughly understands every part of his machine, and has to pass a theoretical and practical trade est in technical matters relating to internal combustion ngines before being admitted to the ranks of motor cyclists.

In nearly every case here, the motor cyclists own machines n private life, and have gained all their technical knowledge rom their motor cycles.

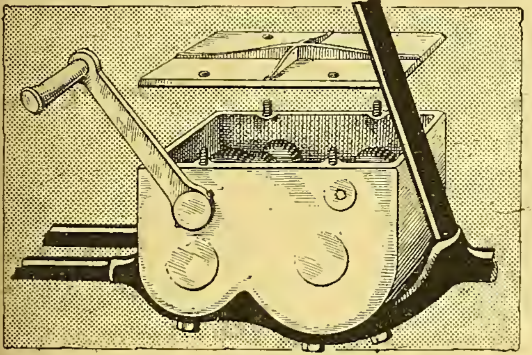
We are sure that you will support us on this point—that t is a grave insult to the whole of the motor cycling raternity that we should be classed non-technical, while ur more fortunate pals the M.T. drivers are classed technial and have all their repairs and overhauls done for them.

I may say that this is the opinion of most motor cyclists erving with the R.A.F., and you would do us a great ervice if you would forward our grievance, through the nfluence of your esteemed journal, to the right quarter.

A FEW NON-TECHNICAL PRIVATES, R.A.F.

MOTOR CYCLE DESIGN.

Sir,—I note your correspondent, "An Australian," remarks n the method of supporting gear boxes. The only proper way is to support the gear box below and leave the top of he box free for removal. By taking off four nuts the cover ould then be taken off at once and the actual process of hanging gear and action of the kick-starter could be seen, lso state of wear of the parts and lubrication. A felt or eather washer under the cover would make the box abso-utely oil and dust-tight, which is not the case when the ront or end of the box is made removable. The present rthodox fashion of hermetically sealing up the "works" n a case is absurd, and it often requires an expert to take he gear to pieces and reassemble.



A suggested method of supporting a gear box.

The box also should be made of a single casting of malleable iron or steel, which is far stronger and cheaper than aluminium, and the slight extra weight is of no practical account whatever.

When will some firm turn out a really practical gear box on the above lines? Sturmey-Archer "works" in such a box would be ideal.

With regard to my remarks on removable back wheel spindles, a loose spindle and gap piece for removal of endless tube would satisfy most riders. The detachable spare wheel is a luxury which all cannot afford (£5 or £6), besides which it is only fitted to a few makes of machines.

M. HITCHCOCK.

A POST-WAR IDEAL.

Sir,—May I ask the favour of a few lines to reply to "Gee Whizz Bang" and Mr. W. R. Deuchar?

"G.W.B." does not seem to like the Radco spring forks, but I wonder if he has ever used a pair for any distance over war time roads. They are absolutely "It."

I must say that I have not seen any new Druids, but it would take a lot to alter my opinion of Radco forks.

I am pleased also "G.W.B." likes my ideas, as I thought they would be hurriedly criticised. A motor cycle on those lines would certainly look and be "hot stuff," as he remarks.

Mr. W. R. Deuchar certainly seems to have backed the winner in his letter regarding "A Tilter at Windmills," and he seems to think that a large single two-stroke on the lines I suggest, with slightly polished copper exhaust pipe, 3ft. long and 2in. bore, and disc wheels, would certainly be a machine on sporting lines.

By the way, "Ixion" seems to have got something "up his sleeve" by what he says in his "Comments" in the April 4th issue. I wonder what it is. G. A. JEAPES.

AVERAGE SPEED.

Sir,—I must apologise for carrying on the much vexed question *re* average speed, but in your issue of January 17th (which has just reached me) "H.C.W." has made one or two mistakes which I think might be rectified. To commence with, he is confusing a certain "Eldon," who, I think, rode a 7 h.p. Indian, with myself, and my 8 h.p. Bat. If I remember rightly, "Eldon" did nine miles in 11m., and my time for nine miles was 10m.

As "H.C.W." knows the Cheltenham-Tewkesbury road so well, I may tell him I started from North Street, Cheltenham, and reached The Cross at Tewkesbury in exactly ten minutes, reaching Worcester (fifteen miles from Tewkesbury and twenty-four from Cheltenham) in twenty-nine minutes. I maintain that with a very fast machine over favourable roads, even when allowing for dangerous corners, it is possible to average a very high speed indeed with perfect safety.

My Bat machine was capable of a maximum speed of close on 80 m.p.h., which speed, of course, was only maintained for a few seconds at a time, but that extra 20 m.p.h. on the maximum of most motor cycles makes all the difference in average speed. Again, a machine so obviously over-powered as mine literally never noticed the hills. For instance, I could go up Harley Bank at something between 50 and 60 m.p.h. till the top corner was reached, where, of course, one would shut down as for the same corner on the level.

I should like to add that, in spite of the very high average speed I used to maintain over give and take roads in all the time I owned the motor bicycle (just over two years), I never had the slightest mishap of any sort. The machine was geared $3\frac{5}{8}$ to 1 fixed gear, and overhead valves.

If a rider knows his mount in and out he can maintain a much higher average, with absolutely no risk to himself or anyone else, than another rider, even if on the same machine, who does not know his mount's peculiarities, chief of which are maximum speed up hill and on the level, acceleration, and braking powers.

I hope I shall be forgiven for trespassing on your valuable space at such length, but I fail to see why a rider who is capable of riding a fast machine with perfect safety to others and himself should not be allowed to do so

In conclusion, may I wish your excellent paper the best of prosperity and success? With luck, we usually manage to get it every week.

May I add that I have no interest in the Bat except as a thoroughly satisfied owner? AD 2815.

E.E.F.

THE BICYCLIST'S EQUILIBRIUM.

Sir,—The articles by Mr. W. Arthur Jones and "Mohandis" in your issues of January 31st and March 14th respectively have provided such interesting reading that I trust I shall be permitted to add a few comments on the points which have been raised.

As Mr. Jones has stated, it is necessary to get down to simple first principles, and he has clearly shown that a deviation from the straight line calls into play a force which he describes as F, tending to right the machine, and he proceeds to discuss the nature of this force. I find myself in complete agreement with him thus far, also with his conclusion that this force is none other than gravity.

In a letter which appeared in your issue of July 14th, 1910, I endeavoured to show how this force was set up, and as many of your readers may not have seen the issue referred to you will perhaps pardon me if I repeat the paragraphs bearing on the subject.

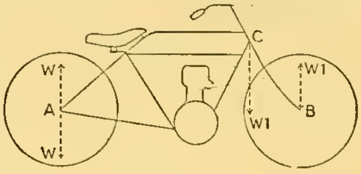


Fig. 1.

"In fig. 1, which represents a bicycle standing upright, we see that the weight of the frame and rider acts vertically downwards at A and C, whilst the supporting reaction of the road acts upwards through A and B. When a rider on a straight course feels he is falling to one side he instinctively turns his front wheel to that side, so that C falls outside the vertical plane through A and B, and the couple W at C and B immediately rights the machine.

"Now when a rider turns his front wheel to get round a corner, besides leaning inwards to balance the centrifugal force he has to overcome this couple in order to balance the machine. When a sharp corner has to be taken quickly the rider has to turn his wheel through a considerable angle, which increases C D (fig. 2) and gives him a greater couple to overcome, viz., W × C D. Hence, by keeping his body still (or inclining it outwards) and inclining the machine inwards still more than it would be if he inclined himself as well, he brings C nearer the plane of A and B, and is enabled to get a greater angle on his front wheel and take a sharper turn in the road."

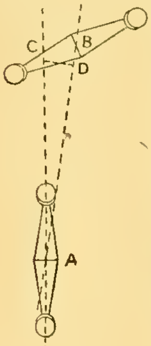


Fig. 2.

"Mohandis" has been at considerable pains in his article to show that the rider's centre of gravity has travelled in a curved path in "righting" a "wobble," and hence centrifugal force has come into play. This is undoubtedly correct, but I am entirely out of sympathy with him when he says, "It is only a question of terminology whether centrifugal force or 'shifting the point of support' plays the greater part in balancing." The second paragraph of my letter quoted above supports the contention of Mr. Jones when he states that centrifugal force simply tends to increase the banking slightly.

I am of opinion that gyroscopic action, which is made so much of by "Mohandis," has very little influence on the balancing of a bicycle, for it is possible to imagine a machine with wheels so light that their gyroscopic action becomes negligible.

R. VINCENT BORNER.

A BAFFLING EXPERIENCE.

Sir,—About midnight recently I had a baffling experience with my countershaft Triumph. Misfiring started, and after a few yards the engine stopped firing altogether. Suspecting shortage of petrol, I looked to this, and found plenty in the tank. By the aid of an extra friendly light I dismantled the carburetter, and found the jet clear, the pipe from the tank free, and a good flow from the tank itself. Evidently ignition, I thought, and held the plug body whilst turning the engine over by kick starter. No shock from the Lodge three-point plug, which had been working perfectly for thousands of miles up to this moment. I tried another Lodge, a single-point racing plug, with the same result. I laid the plugs on the cylinder and got a spark from each in turn, replaced the original—no shock with plug *in situ.* Tried the single-point again; still no result. Held termin and got healthy shock, replaced terminal on plug, and trie again. Nothing doing! By this time I was rather fed u so invoked assistance from a mechanic at an adjacent 'bu garage, who, with my help, went over the ground agai with similar fruitless results.

My last train home being perilously near, I decided t leave further investigation until next day, and left th machine with the friendly mechanic. Next morning whe I called he invited me to try to start as usual. Taking n risk with the Government petrol, I injected, tickled an kicked, with the result that it roared out at first kick The original three-point plug was used. I asked him wha he had done, and he said, nothing but clean the plug an close up one of the points a little. The plug was not reall dirty, and the points were as they have been for month past. I tried the single-point plug, which had been in m pocket amongst tobacco dust, etc., all night, with sam result—fired first kick.

I have tried to fathom the mystery, but own myself beaten I have read in the past about plugs that would spark out side, but would not spark under compression, but could no find any reference in "Hints and Tips" and "Motor Cycle and How to Manage Them," which have an honoured plac on my shelf. The magneto and high-tension wire were presumably, right, or we should not have got a spark fro each plug when outside. The fault could not have been wit the plug, as the single-point worked the next day, althoug not touched or cleaned in the interim. On the contrary it had been in the pocket of a damp overall all night.

As it happened I was not terribly inconvenienced, havin a garage near to which to take the bicycle and a station 25 yards away where I could get a train. But picture me mile from anywhere at the same hour, viz., midnight, with s baffling a problem.

Perhaps it can be easily explained. If not, and you thin the subject of sufficient interest, I shall be glad if yo can find room in *The Motor Cycle* for my letter. Some o your readers may have had a similar experience, or possibl Messrs. Lodge or the Triumph Co. may be able to thro light on the subject.

F. W. CHAPMAN.

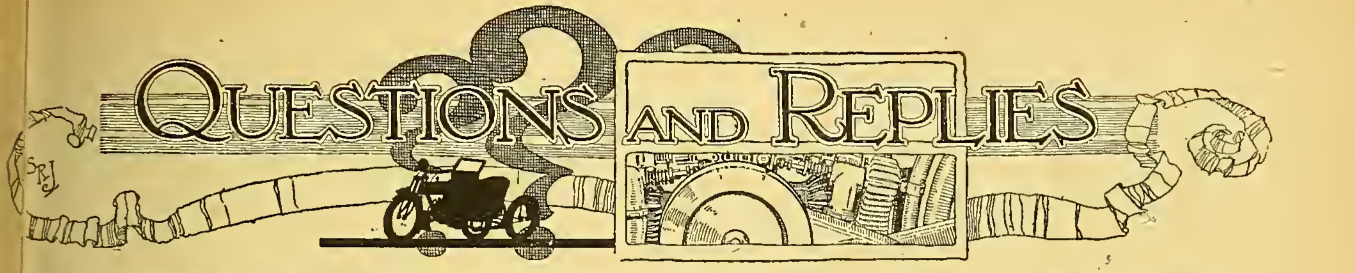
AERO AND MOTOR CYCLE ENGINES.

Sir,—Some little time ago "Road Rider" stated that 200 c.c. flat twin engine built on aero engine principle would equal in road performances the standard of a 4 h.p single-cylinder. Now steel cylinders, aluminium allo cylinder heads, and aluminium alloy pistons will not trans form a 2 h.p. engine into a 4 h.p. engine. Such an engin as "Road Rider" describes would probably have to b geared in the neighbourhood of 10 to 1 on top to giv the power output of the modern 4 h.p. single, and, sinc he states that the upper third of the revolution curve has been surrendered in the interests of dogged pulling on hills the engine would therefore be very slow compared to th present 4 h.p. single. The revolutions would be tremendously high from the start of a run to the finish, and I question whether the aluminium cylinders and pistons would prevent overheating and consequent carbonisation. "Road Rider" proposes fins of paper thickness. Now this thinness of the radiating fins can be carried too far, a paper thickness fins would pass very little heat from th cylinder. Radiating fins should be fairly thick where they join the cylinder and thin at the edges. They must hav sufficient body of metal in them to carry away the flow of heat from the cylinder walls. The same argument applies to the thin piston head supported by a bracket bearing on the gudgeon pin proposed by "Road Rider." In an aluminium piston the piston top can be made twice as thick as cast iron with advantage, in that the continuous flow of heat on the top of the piston is rapidly conducted to th cylinder wall. With a bracket supporting the top of th piston a large proportion of the heat would be conveyed to the little end bearing, which is undesirable.

Apart from all these things, his engine would make an awful fuss and clatter with its four overhead valves pe cylinder, and would take up a great deal of time keeping tappets and rocker arms adjusted. Aluminium cylinders and pistons will become universal, in my opinion, but obviously the engine must have sufficient cubic capacity to enable it to do its work easily and to maintain its tune.

Worcester. 670 C.C.

QUESTIONS AND REPLIES



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," , Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents e urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal iestions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Carrying a Passenger.

Could you please tell mé if I am allowed to take anyone in my sidecar when I am on business? I am a commercial traveller, and use a motor cycle and sidecar my rounds.—W.C.

If ou have a permit or other permission to use your machine, the carriage of a passenger does not in any way affect the permit.

The Motor Spirit Restriction Order.

(1.) Could permission be got to drive a motor cycle from Swansea to Gloucester on the grounds of change of residence? (2.) To whom should the application be dressed? (3.) Would the Inland evenue licence have to be paid? (4.) have sufficient petrol saved from last ason, and my driving licence does not pire until May 24th. Would it be ise to apply for sufficient petrol for ie journey under the circumstances of ie last question?—R.H.H.

(nd 2.) A special permit is not usually n essary, but it might be as well to put tl circumstances of the case before the P rol Controller, 19, Berkeley Street, L don, W.1. (3.) Yes; the local t ation licence has to be paid. (4.) W en permit is granted you may use the p rol in question. Whether you will n d more petrol is for yourself to say, as it epends on how much you have in stock.

Joining the A.S.C.

I should be glad if you or any of your readers could supply me with any information regarding the O.T.C. of the A.S.C., M.T. —B.H.H.

u should obtain an A.F. M.T.393A f n any military depot, or if no local d ot can supply you with this form you s uld be able to obtain one from the C . Troops. This form must be filled i and returned to the O.C. of the A.S.C., M.T., O.T.C. The statement will have t be supported by a present A.S.C. o cer who can vouch for your qualifica- t ns from personal experience. The t ining depends entirely on the branch o the A.S.C., M.T., for which you intend t enter, and can only be satisfactorily a swered by the O.C. or adjutant of the O.T.C. himself. Particulars as to pay, u iform, etc., may be obtained from the S cretary of the War Office, Whitehall, I ndon, S.W.1. If you are already in t Services all steps must be taken t rough your present O.C. in the ordi- ry way.

The Paper Shortage

An Urgent Request to our Readers.

THE supply of paper is now so restricted that only by exercising the greatest economy and eliminating the possibilities of waste can the publishers of "The Motor Cycle" continue to meet the requirements of the public.

The position is serious, and is likely to grow worse as month by month the war makes greater demands upon the available shipping space.

Once again and with greater urgency an appeal is made to readers to lend their assistance to the publishers in effecting the necessary economy by placing definite orders with their newsagents for copies to be reserved or delivered each week.

This will enable the newsagents to limit their orders to the numbers they can actually sell, and thus avoid the wastage that may be caused by copies ordered to meet chance sales being left unsold.

If each reader will order and regularly obtain his copies from the same newsagent the publishers will be in a better position to gauge the requirements week by week, and, by strictly limiting their printing orders, keep the consumption of paper within the limits demanded by the present situation, while at the same time ensuring sufficient copies being available for all regular readers.

In view of the gravity of the position, those readers who have not yet given orders to their newsagents are urgently requested to take this very necessary step immediately.

Starting Motor Cycling.

I am thinking of going in for a lightweight motor cycle. Can you advise me as to what type would suit me, as it will be my first mount? Should I find any difficulty in obtaining a licence for petrol or driving?—H.H.L.

Your query is far too general to admit of a definite answer; so much depends on your age and requirements. You will find very great difficulty in obtaining a licence for petrol at the present time, but no difficulty in procuring a driving licence.

Boiling Alcohol as Fuel.

A few years ago, probably about three, I remember reading in *The Motor Cycle* an account of an American engine which derived its power from boiling petrol. If my memory serves me rightly, the engine was a form of rotary and circular in design. There were one or two illustrations given, and it was stated that the engine was of a type commonly used in the United States for motor boat work up to just a few years before the appearance of the article. Perhaps you can help me in tracing this article so that I can have another look at it.—D.W.

We think you must be referring to an engine which runs on boiling alcohol. This is described in *The Light Car* for November 14th last. The Low engine used boiling petrol, but this was an English production.

Reassembling a Hub Gear.

I have just had my Sturmey-Archer hub to pieces, and when I came to put it back again I had to throw the clutch out before I could force the plates in again, of which there seemed to be about twice too many. Now they are back the free engine clutch will not act at all, and the wheel is terribly hard to pull round. Can you tell me of any remedy for this, as I have tried everything of which I can think?—S.L.

There are so many possible faults in reassembling the three-speed hub gear that it is impossible to diagnose exactly the cause of your trouble without the chance of seeing the hub. We assume that you have ascertained that the clutch operating rod is working properly, and that the adjustment of this rod will not cure the trouble. If, as you say, you found the plates would not go back in the original space, we suggest that you take the gear to a competent repairer.

Removing the Valve Guide.

The valve guide of my 3½ h.p. Zenith (J.A.P. engine) is slightly broken inside and outside. Is it possible for an amateur to remove the old one and insert a new one? If so, would you please tell me the best method?—G.A.H.

The best plan will be to heat the cylinder round the valve guide with a blow pipe, and this, you will find, will loosen the guide sufficiently, so that you will be able to remove it by means of a spanner.

Truing Up Flywheels.

I have taken the flywheels out of the crank case of my 2¾ h.p. New Hudson motor cycle to have the little end rebushed, and would be obliged if you would help me out of the following difficulty. How can I know whether the two flywheels are true after I have put the connecting rod on and fastened the nut on the crank pin? I have no lathe—W.W.R.

It is rather a difficult job to get the flywheels quite true without a lathe or suitable jig. We suggest you get the crank pin nut fairly tight, and then place a straight edge across the flywheels at different points round their edges. This will enable you to see at a glance whether or not the flywheels are true. By judiciously tapping them you can soon get them perfectly even, and you then tighten the crank pin nut as tightly as you can get it.

All about Two-strokes.

Would you be kind enough to answer the following queries concerning a Junior Triumph two-stroke? (1.) I wish to find out if the petrol level and jet are correct without having to tinker about with the carburetter. Is there any means of judging this by, say, the amount of air it takes? I cannot judge by mileage, as I only do about ten miles per week. The machine is running well, but I wish to economise as much as possible compatible with good running. (2.) I believe that to lower the level I should have to lower the float by tapping down the collar above it (as it is an overhead feed). I should be glad if you would give me full directions how to do this, and what distance it should be lowered. What effect would only half opening the petrol tap have? (3.) What distance apart should the plug points be? (4.) The carburetter on the machine is the original one put on by the makers. At present I have float with hollow part underneath. Is this correct? (5.) How can I tell if the needle is worn? (6.) In going a long run, is it necessary to give extra oil at all, and how? (7.) Could you tell me the principle of petroil lubrication? Does the oil get separated from the petroil in the carburetter? (8.) Will you please tell me if it is necessary to grind in the exhaust release valve at all?—A.C.S.

(1.) You may be pretty certain that the level is correct unless anybody has been interfering with the carbureter. The only means of finding out is to remove the top of the vaporising chamber of the carburetter so that you can see the jet. Take the jet out and in its place fit a wide tube of the same height as the jet when pushed into position. This would be a sort of dummy jet fitted in place of the standard jet. You then turn on the petrol and allow the float chamber to fill, when the level should be just below the top. You will know that you have the correct jet in your engine by the fact that you can only open the air fully when travelling at full speed. (2.) As we mentioned before, it is most unlikely that the petrol level is incorrect. If it is you will know this by the fact that if the level is too high petrol will be always overflowing from the jet, and the consumption will be very high, while if it is not high enough the carburetter will be starved, the engine will be difficult to start, and there will be loss of power and irregular running. The collar referred to is a tight fit and soldered as well, and to remove it it will have to be held in a gas flame, then the collar gently tapped. To reduce the level collar is lowered on the needle. One thirty-second of an inch will make an appreciable difference. The effect of only opening the petrol tap half-way might be that the carburetter would be starved of petrol. (3.) Rather over half a millimetre. (4.) This arrangement is quite correct. (5.) By the carburetter flooding violently. (6.) No; this should not be necessary. (7.) The oil and petrol mixed flow through the jet, and as they enter the crank case the petrol becomes vaporised, leaving globules of oil to lubricate the cylinder and bearings. (8.) Not unless it leaks and you lose compression through it.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

The Low-tension Magneto.

Will you please inform me if I can run a low-tension magneto either way? The timing on the engine (cycle) works anti-clockwise and the low-tension magneto clockwise. I want to work with a chain. Can I get a book on low-tension magnetos?—C.L.D.

If the contact breaker is not driven from the magneto in any way there is no reason why the magneto should not revolve either clockwise or anti-clockwise. The direction of revolution is determined entirely by the setting of the contact breaker. We assume that your magneto is of the rotating and not of the oscillating type. If of the latter, there is, of course, no question of clockwise or anti-clockwise. As the low-tension magneto is now obsolete except on stationary engines, we regret that we cannot tell you of any book dealing with it. It would be dealt with, however, in any old book on ignition systems for motor ca but such a book would most probably out of print, and consequently diffic to obtain.

The Local Taxation Licence.

Would you kindly inform if it is compulsory for me to the local taxation licence f motor cycle, as I have not tal it out owing to the petrol restı tions? The authorities have threater me for not so doing. Are there means of avoiding payment of the d under the present circumstances?—A

You are not compelled to pay the local taxation licence in respect of machine which is kept *but not us* The authorities, therefore, can take steps against you if you do not use motor cycle.

Loss of Power on a Two-stroke.

In May, 1916, I purchased 2½ h.p. Ixion two-stroke mo cycle. I rode it six months, w an average mileage of 120 week. I then joined the Ar and put it by for twelve months I returned again. It was kept ir thoroughly dry place, and was looked after. About a month afte began to use it again it lost consid able power, and would not climb e a moderate hill on high gear (it is two-speed machine). I purchased a fitted a new piston complete, but t has made no difference. I shall glad if you will let me know what think is the cause of loss of power a how it could be remedied.—R.B.

If you are quite certain that the pis rings are not gummed up and are a g fit in the cylinder, we should advise to make a careful search for air lea both in the induction system and in crank case, *e.g.*, round the washer at join between the two halves of the cra case. Also, it would be a good thing ascertain that all the ports (inlet, exhau and transfer) are quite clear and f from obstruction.

RECOMMENDED ROUTES.

Market Weighton to Dudley.—H.K.

Market Weighton, Selby, Doncast Worksop, Mansfield, Derby, Burt Lichfield, Walsall, Dudley.

Abergavenny to Longton.—W.L.

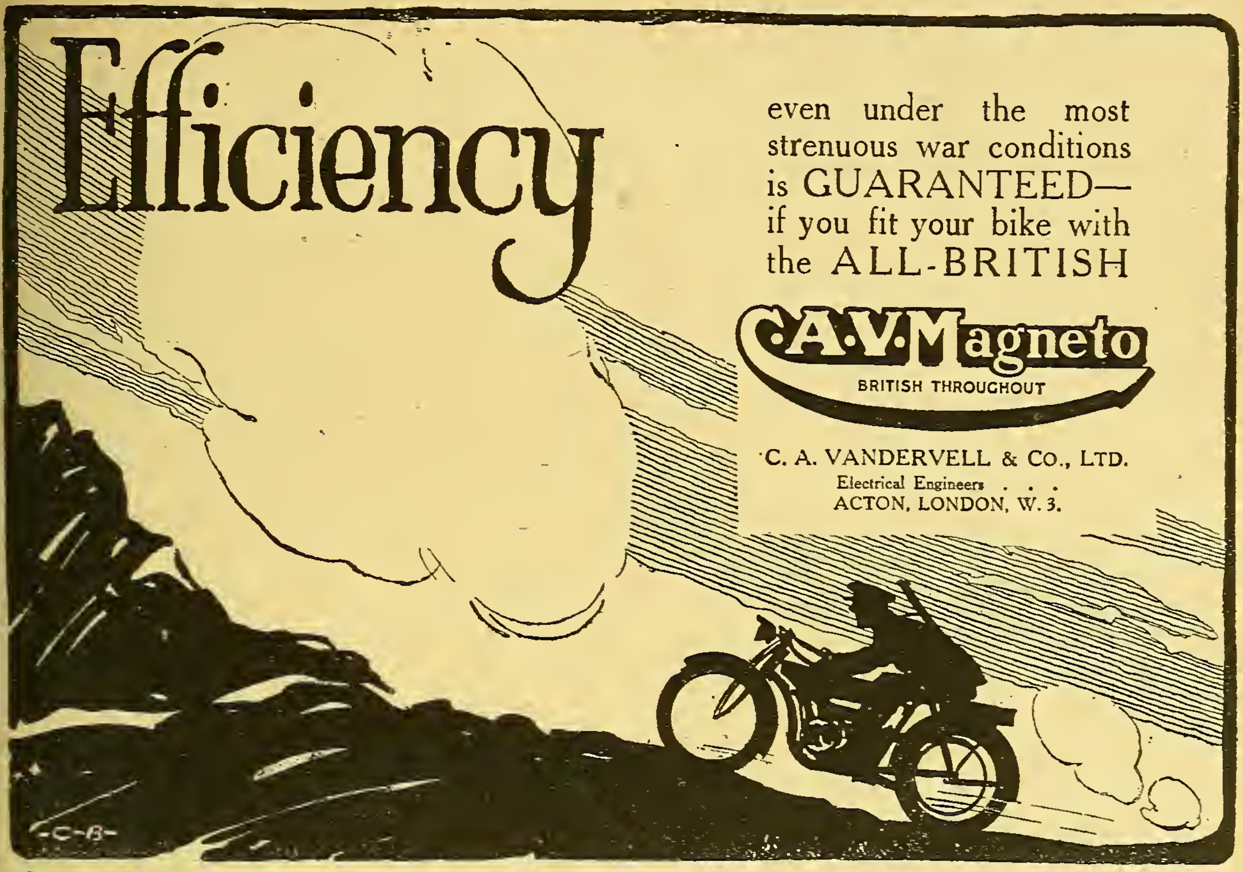
Abergavenny, Hereford, Bromya Great Witley, Stourport, Kidderminst Wolverhampton, Penkridge, Staffo Stone, turn to right at Trentha Longton.

Ludlow to Brighton.—M.K.

Ludlow, Hereford, Ledbury, Tewk bury, Cheltenham, Northleach, Burfo Witney, Oxford, Henley, Maidenhe Windsor, Staines, Chertsey, Guildfo Horsham, Henfield, Brighton.

Sutton to Llandrindod Wells.—R.E.

Sutton, Kingston, Staines, Winds Maidenhead, Henley, Nettlebed, D chester, Oxford, Witney, Northlea Cheltenham, Tewkesbury, Ledbu Hereford, Willersley, Hay, Three Co Inn, Builth, Llandrindod Wells.



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even under the most strenuous war conditions is GUARANTEED—if you fit your bike with the ALL-BRITISH

C.A.V. Magneto

BRITISH THROUGHOUT

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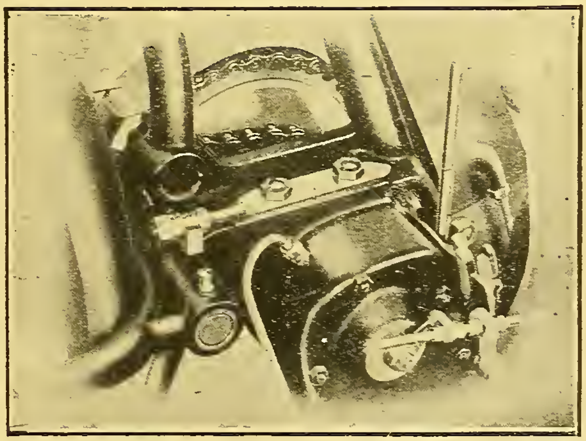
Electrical Engineers . . .
ACTON, LONDON, W. 3.

A Post-War Feature of the

1918 Powerplus Indian Motocycles

We regret that we are not in a position to supply motorcycles at the present time, but we can send 1918 abridged descriptive lists on application. This applies to Great Britain —— only. ——



The Powerplus Gear Box showing micrometer adjustment. By turning the nut at the left, the box can be moved to get the correct tension on the short chain.

HENDEE MANUFACTURING COMPANY,

"Indian House," 366-368, Euston Road, London, N.W.

Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."

AUSTRALIA—
109-113, Russell St., Melbourne.

CANADIAN WORKS—
12-14, Mercer St., Toronto.

AFRICA—
Indian House, 127-9, Commissioner St., Johannesburg.
Indian House, 579, West St., Durban.
Indian House, Strand Street. Port Elizabeth.

MISCELLANEOUS ADVERTISEMENTS.

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Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

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SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

1916 4h.p. A.J.S. Combination, spare wheel; bargain, £66.—86, High Rd., Lee. [4652

A.J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

1916 6h.p. A.J.S. Combination, only done 1,700, lamp, horn, and Cowey, not been used for 18 months, perfect; £85.—Wilderspin, Chatteris. [4464

A.J.S., 4h.p., late 1915, renovated 1918 standard by A.J.S. at cost of £25, Millford sidecar, as new, perfect condition; £75, near offer, bargain.—Captain, 99, Kedleston Rd., Derby. [X3598

A.J.S. 1916 Combination, 6h.p., splendid outfit, all accessories, spare wheel, hood, screen, etc., £97/10; 2¾h.p., 2-speed, £34; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3641

A.J.S. 1914 6h.p. Combination, 3 speeds, all accessories, hand controlled clutch, and kick start; a bargain, £53.—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [4731

A.J.S., late 1917, 6h.p., and coach sidecar, numerous accessories, 3 lamps, in absolutely new condition, 700×80 tyres (unpunctured); £95, or part exchange 2¾h.p. same make.—Box 1,840, c/o *The Motor Cycle.* [X3379

IF IN NEED OF A **Motor Cycle** or **Combination**

EITHER FOR **WAR WORK or BUSINESS PURPOSES,** WRITE TO

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Polished and Plated.

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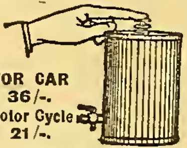

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engineering or the productions of munition
of war, or substances required for the pro
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words, "No person resident more than
miles away, or already engaged on Govern
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effect that no person already engaged o
Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. Motor Cycles.—Immediate delivery of M
model, complete, detachable wheels, 700×80
£91/6; trade supplied; no permits required.—
Evans, sole agent for Birmingham and district,
John Bright St., Birmingham.

A.J.S., 6h.p., and sidecar, with wind screen, lam
horn; this is one of the latest 1915 models
out, as it left the works in October, 1915. The
has been thoroughly overhauled and revarnished,
is practically equal to new in every possible res
price only 70 gns.—Julian, 84, Broad St., Re
Biggest light car and motor cycle dealer in the
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A.J.S. Spares; prompt delivery. — Cyril Wil
Chapel Ash Depot, Wolverhampton.

Alldays.

ALLON, 2¾h.p., single, £38, new; 2-speed, £45,
2-speed and hand clutch, £48, new; 2-
£28/10; E.P., or exchange.—Service Co., 292,
Holborn, London. [X

ALLON, 2¾h.p., brand new, 2-stroke, never be
the road, and guaranteed; reduced price
Maudes' Motor Mart, 100, Gt. Portland St., Lo
W.1. Tel.: 552 Mayfair.

Ariel.

1914 5-6h.p. Ariel 3-speed Combination; ba
£38.—86, High Rd., Lee.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3
countershaft models in stock.

ARIEL, 3½h.p., B. and B., less mag.; £6/10.—L
ston, Claremont, Aghrigg Rd., Wakefield. [X

1917½ 3½h.p. Ariel, kick start, done 200
coachbuilt sidecar, all accessories; £75,
change War Loan.—C.C.H., 19, Broad St., Stan
Lincs. [X

Bat.

BAT, 6h.p., 3-speed countershaft, special model;
—Kennard, 18, Myddleton Sq., Islington.

BAT-J.A.P. 1916 Combination, Norton coac
sidecar, 6h.p., 3 speeds, countershaft, spring
accesssories; £55.—Seen 91, St. Margaret's Rd
Margarets, Middlesex.

1914 Bat-Jap, sporting, special 8h.p. engine,
4-speed Jardine gear, coach sidecar, screen,
all tyres new condition, and whole turnout thoro
sound, lamps, and tools; £50.—Kenington, 17, Cha
Lane, Willesden Green.

B.S.A.

B.S.A., T.O.M. model, 3-speed; £37/10; E.P. o
change.—Service Co., 292, High Holborn, Lo
[X

B.S.A. and Sidecar; a bargain, £27/15.—Wi
Simpson and Co., 11, Hammersmith Rd. (op
Olympia), London.

B.S.A., 4¼h.p., 1917, and Montgomery coac
sidecar, countershaft 3-speed gear, belt drive, l
horn, in perfect order; accept £65.—Box L6,005
The Motor Cycle.

Calthorpe.

1915 2¾h.p. Calthorpe-Jap, 2-speed, fast; £20
High Rd., Lee.

1915 Calthorpe-Jap, 2¾h.p., 2 speeds, almost
bargain, £25.—Box L6,022, c/o *The Motor*

CALTHORPE, 2h.p., 2-speed, Precision engine,
fect condition; £20.—Grimshaw, 50, Whalley B
Blackburn. [X

1916 Calthorpe-Jap, 2¾h.p., Enfield gears, prac
new; £28.—P. Fonteyn, 85, Sinclair Rd.,
don, W.14.

OTOR CYCLES FOR SALE.

Calthorpe.

THORPE-J.A.P., 1915, 2-speed. lightweight; can be seen.—Powell, 13, Spenser Rd., Herne Hill, , S.E. [4620

THORPE 2-stroke, Enfield 2-speed, new, but ghtly shop-soiled; special bargain, £27/15.—Wil- mpson and Co., 11, Hammersmith Rd., London. [4635

THORPE Motor Cycles.—All models in stock for mediate delivery; trade supplied; no permits d.—P. J. Evans, 91, John Bright St., Birming- [4309

Campion.

PION Combination, 6h.p., splendid outfit, 3-speed urmey-Archer countershaft gear, speedometer and all chain drive, Bosch mag., luxurious coachbuilt ; cost £115 (new last July), very little used; best cures.—Box 1,855, c/o *The Motor Cycle.* [X3525

Chater-Jap.

9 4h.p. Chater-Jap, 2-speed; £16; appointment.—53, Brownhill Rd., Catford. [4655

Chater-Lea.

9 7-9h.p. Chater Combination, 3-speed; £50.—86, High Rd., Lee. [4651

Clyno.

9 Clyno and Sidecar for sale, minus gear box, Binks carburetter; what offers?—Rice, 29, Wal- d, Luton, Beds. [4601

NO, 2½h.p., 2-stroke, 2-speed gear, just over- uled, complete with lamps and horn, property er, not used for 12 months; £20.—Box L6,006, e *Motor Cycle.* [4606

NO, 1914, 6h.p., 3 speeds, kick start, coachbuilt decar, detachable wheels and spare, finished mili- ey; a bargain, £50.—Maudes' Motor Mart, 100. rtland St., London, W.1 [4734

NO 1914-1915 6h.p. Coachbuilt Combination, ood, storm sides, Klaxon, speedometer, Lucas new condition; any trial; heap spares, new etc.; 58 gns., real bargain.—Lane, 11, Pretoria althamstow, E.17. [4616

NO Combination, 1914, 6h.p., four interchange- le disc wheels, speedometer, Enk easy starter, horn, mechanical horn, 3 lamps, 3 generators, sidecar, hood, screen, luggage carrier, spares, etc., een overhauled; £65.—31, Douglas St., Barrow- ness. [X3573

Connaught.

9 2¾h.p. Connaught, 2-speed, good order; £18.—86, High Rd., Lee. [4646

Coventry Eagle.

ENTRY Eagle, 2½h.p., 2-stroke Villiers engine, and new, and guaranteed, but shop-soiled only; laudes' Motor Mart, 100, Gt. Portland St., Lon- .1. Tel.: 552 Mayfair. [4733

Dayton.

9 Dayton de Luxe, 1½h.p., U.H., Amac, Watford, Xl'all saddle, good running order and condition; , lowest.—Darke, Waterloo House, London Rd., Surrey. [4625

Douglas.

9 2¾h.p. Douglas, 2-speed, good order; £25.—86, High Rd., Lee. [4647

GLAS.—Prompt delivery to those on work of tional importance.—Gibb, Gloucester. [4749

GLAS, 1915, 2¾h.p., 3-speed, little and carefully sed; £40.—H. Wareing, 182, Portland St., South- [X3586

GLAS, 1912-13, 2-speed, very fast, perfect; 19 ns.; appointment.—Miss D. Minns, Mayall Rd., . [4694

GLAS, 1915, 2¾h.p., Bosch, 2 speeds, Colonial model, excellent order; £36.—Rush, Broadway, rough. [4617

GLAS, 1911-12, 2¾h.p., 2-speed, lately over- auled; great bargain, £14/10.—Box L6,020, c/o *otor Cycle.* [4747

GLAS; prompt delivery to farmers, doctors, and thers doing work of National importance.—Moffat, . Tel.: 60. [5855

4 T.T. Douglas, 2 speeds, lamps, horn, good condition; £35.—Elce and Co., 15-16, Bishopsgate amomile St., E.C.3. [0492

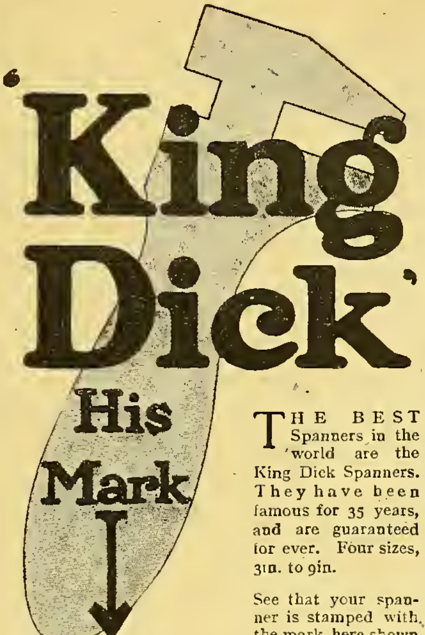
3-14 Douglas, 2-speed, clutch, K.S., lamps, horn, etc., absolutely reliable; £26.—Merifield, 34, Clif- d., Kingston-on-Thames. [4690

or near offer.—2¾h.p. 2-speed 1912 Douglas, yres nearly new; bargain.—Foreman, 83, Black- Rd., Greenwich, S.E.10. [4725

UGLAS, 1912, 2¾h.p., 2-speed, clutch, speed- meter, lamp, tools, new tyres, all in new condition; Priest, Connaught Av., Frinton-on-Sea. [4596

UGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, ouglas agent, 196, Cheltenham Rd., Bristol. [0923

UGLAS, 1916, 2¾h.p., 3 speeds, kick starter, in perfect condition, complete with horn, speedometer, etc.; £55.—Painter, 99, Broadway, Cricklewood, [4619



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MOTOR CYCLES FOR SALE.

Douglas.

DOUGLAS, 2¾h.p., 1912-13, 2-speed, clutch, kick starter, splendid condition and running order; £23, or exchange higher power.—Holland, Hoy Co., Whitstable. [X3576

DOUGLAS, 1916-17, 2¾h.p., 3-speed, clutch model, footboards, lamp, horn, complete, good as new, not been run 300 miles; £50, or near offer; bargain.—Aubyn, 39, Kensington, Liverpool. [X3527

4h.p. Douglas, 3-speed, 1916, four nearly new tyres, two handle-bars, two belts, lamps, generators, horn, many spares, condition as new; £56, for quick sale.—Box L6,003, c/o *The Motor Cycle.* [4600

DOUGLAS, 2¾h.p., 1911, Bosch mag., Binks carburetter, all accessories, footboards, splendid condition, 120 m.p.g., petrol, spares; best offer over £18; evenings.—Ballard, 31, Hyde Vale, Greenwich. [4701

DOUGLAS 1915 Genuine 4h.p. Combination, 3 speeds and kick start, coachbuilt sidecar, wind screen, all accessories, requires small adjustments only; a bargain, £60.—Maudes', 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [4735

PETROL Restrictions.—1912 2¾h.p. countershaft Douglas, tyres and mechanical details guaranteed perfect, noiseless, semi T.T., B170 saddle, slow running, fine climber, and 42 m.p.h.; bargain, £18 cash, no offers.—West, Baddow Rd., Chelmsford. [4602

RIDER TROWARD and Co.—Douglas, 1914, 2-speed, clutch, kick start, 34 gns.; 1914 T.T., 2-speed, 34 gns.; 1913 T.T., 2-speed, 27 gns.; 1913 single-speed countershaft, 21 gns.; 1912, 2-speed, 19 gns.; 1912, single speed, 17 gns.; 1911 single speed, 14 gns.; Douglas spares in stock, including gear boxes and engines. [4757

LATEST 2¾h.p. W. Douglas, brand new, with new pattern hand-controlled clutch, latest front forks, many other improvements, £54, plus 20%; also U. and V. models, 1916 specification, £50, plus 10%, absolutely new. Immediate delivery against Priority Permit for doctors, farmers, war and munition workers.—How and where to apply, full particulars, write Douglas Specialists, Robinson's Garage, Green St., Cambridge. [4659

Enfield.

6h.p. Enfield Combination, wind screen, speedometer, etc.; £48; excellent condition.—Public Baths, Lewisham, S.E. [4613

ROYAL Enfield, 2-speed, free engine, 2¾h.p., light sidecar, nearly new condition; £29/10.—Appleton, 84, High St., King's Lynn. [X3470

ROYAL Enfield, 1917, 3h.p., 2-speed twin, Lucas lamps, mechanical horn, several spares.—Wren, 41, College St., Springhill, Birmingham. [X3597

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

ENFIELD Combination, 1915, lamps, horn, speedometer, spring handle-bars, all in good condition, spares; sacrifice £58.—Boult, Hairdresser, Chesterfield. [X3474

ENFIELD 6h.p. 1916 Combination, coachbuilt sidecar, light car tyres, fully equipped; £85.—Mebes and Mebes, 154-6, Gt. Portland St., W.1. Tel.: 3426 Mayfair. [4705

WAR Bargains.—Late model 3h.p. twin Enfield, engine, gears, tyres, etc., as new, 2-speed, kick starter, fast, powerful, all tools, etc.; accept £29, lowest, no offers.—Bon Marche, Chesterfield. [X3583

ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X3633

3h.p. Royal Enfield, 2-speed gear model, 1914, £25; also a 1915 3h.p. 2-speed model, £33/10; and a 3h.p. 1916 model, £37/10; all fitted with 2-speed gear, kick starters, and accessories.—Wauchope's, 9, Shoe Lane, London. [4717

6h.p. Enfield 1917 Combination, fully equipped, with hood and screen, and all tools and accessories, taken in stock from the Enfield works, being thoroughly overhauled by them, and is mechanically sound as new, £97/10; also another 6h.p., Lucas dynamo lighting set combination, also overhauled by the makers, £97/10; also a 6h.p. 1916 combination, complete, £85; 1914 6h.p. combination, £55; 1913 combination, £45; also another at £35; guaranteed.—Wauchope's, 9, Shoe Lane, London. [4711

Excelsior.

1914 Big Excelsior, single, clutch model, powerful; £16.—86, High Rd., Lee. [4644

Fearnought.

FEARNOUGHT-PRECISION, 2¾h.p., 1916, lamps, tyres as new, perfect condition; £15/10.—Oswell, Hadley, Salop. [4669

Harley-Davidson.

1915 7-9h.p. Harley Combination, perfect order; bargain, £50.—86, High Rd., Lee. [4649

1917 Harley-Davidson Combination, magneto model, lamps, horn, excellent condition; £115.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0491

HARLEY-DAVIDSON, 7-9h.p., late 1914, petrol and paraffin, Mills-Fulford sidecar, excellent condition; £60, bargain.—Sharpe, Gladwyne, Rushby Mead, Letchworth. [4707

MOTOR CYCLES FOR SALE.

Harley-Davidson.

7-9h.p. 1916 Harley-Davidson Solo Machine, 3 speeds, etc., grand condition; £65.—Wauchope's, 9, Shoe Lane, London. [4712

LATE Model Harley Combination, enamelled latest colour, and overhauled by makers, 7-9h.p., electrical model, as new; 68 gns.—40, Clonmore St., Southfields, S.W.18. [4754

FOR Sale, Harley-Davidson combination, late 1916, 7-9h.p., guaranteed perfect condition; must be sold at once.—Particulars, Mr. Bolderstone, Royden Hall, King's Lynn. [X3471

7-9h.p. Harley-Davidson Combination, 1916 model, bought Jan., 1917, cost £120, price £80, condition new, guaranteed perfect, not ridden 1,000 miles; exchange 1916-17 2-seater Perry or Rover car, cash adjustment.—Baldwick, Pickle Manufacturers, St. Alban's Terrace, Sherwood St., Nottingham. [X3522

Hazlewood.

HAZLEWOOD 5-6h.p. Combination, J.A.P. engine, 3-speed, clutch, and K.S., lamps, speedometer, special sidecar; £65; E.P. or exchange.—Service Co., 292, High Holborn, W.C.1. [X3631

Humber.

1911 3½h.p. Humber, 2-speed; bargain, £10.—86, High Rd., Lee. [4642

3½h.p. Humber Combination, 2-speed, nice condition; £19 nett.—10, Norwood Crescent, Southport. [X3580

1911 3½h.p. Humber, free engine, 2 speeds, perfect order, splendid condition; £14, bargain.—Box 1,866, c/o *The Motor Cycle.* [X3614

Indian.

1914 7-9h.p. Indian 2-speed Combination, less body; bargain, £32.—86, High Rd., Lee. [4653

INDIAN, blue, 5h.p., nice order; £25, or exchange.—Brown, Rangemore Village, Burton-on-Trent. [X3606

INDIAN, 7-9h.p., 1914, 2-speed, clutch, T.T., excellent condition, all accessories; £30, or exchange for Douglas with cash.—262, Blackhorse Lane, Walthamstow. [X3592

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead, have the following Indians in stock for immediate delivery: One 1916 Powerplus Indian. 8-10h.p., 3-speed, T.T. bars, 59 gns.; one 1915 7-9h.p. Indian, 3-speed, electric light, Phœnix coach sidecar, disc wheels, 59 gns.; one 1914 7-9h.p. Indian, 2-speed, coachbuilt combination, electric lighting, in fine mechanical order, 52 gns.; three 1915 T.T. 7-9h.p. Indians, clutch models, one with disc wheels, 37 gns. each; one 1915 T.T. 5h.p. 3-speed Indian, 39 gns.; two 1914 7-9h.p. Indians, spring frame, 2-speed clutch models, 36 gns. each; two 1914 7-9h.p. clutch model Indians, 29 gns. each; also most Indian parts. State requirements. [4758

James.

JAMES, all new models; extended payments or exchange.—Service Co., 292, High Holborn, London. W.C.1. [X3627

Levis.

1917 2½h.p. Levis, 2-speed, chain drive; £30.—86, High Rd., Lee. [4641

LEVIS Popular, just overhauled, new tyre; bargain, £16.—Pells, Buntingford. [4608

LEVIS, 2-speed, £25; single, £19/10; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3638

2¼h.p. Popular Levis, 2-stroke, suitable for lady or gentleman; £20.—Wauchope's, 9, Shoe Lane, London. [4713

1915 2¼h.p. Levis 2-stroke Popular Model, in excellent order; £25.—Robinson's Garage, Green St., Cambridge. [4661

LEVIS, 2½h.p., Model E, Enfield 2-speed, chain drive, brand new, in stock; £47/10.—Wilkins, Simpson and Co., 11, Hammersmith Rd., London. [4636

Lincoln-Elk.

LINCOLN-ELK, 1916, 2¾h.p., h.b.c. clutch, E.I.C., lamps, horn, perfect running order, petrol; or exchange for higher power, not earlier than 1916.—Box L6,019, c/o *The Motor Cycle.* [4746

Matchless.

1915 7h.p. Matchless Combination, dynamo, spare wheel; £76.—86, High Rd., Lee. [4654

MATCHLESS, 1913, 2-speed J.A.P., nice condition; £30, or lower power.—16, Carlyle Rd., Manor Park, E.12. [4615

MATCHLESS Latest War Model Combination, complete with detachable wheels, spare wheel and tyre; £120.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3523

MATCHLESS 8h.p. Combination, J.A.P. £75, or M.A.G. engines £67/10; 8h.p. combinations, new, fitted with J.A.P. or M.A.G. engines; E.P. or exchanges.—Service Co., 292, High Holborn, London, W.C.1. [X3628

RIDER TROWARD and Co., 31, 40b, and 78, High St., Hampstead.—Matchless 1916 8h.p. M.A.G. coachbuilt combination, 69 gns.; Matchless 1915 8h.p. J.A.P. coachbuilt combination, 59 gns.; both above are 3-speed, clutch, and kick start, all chain drive models; Matchless 1913 6h.p. 2-speed J.A.P. coachbuilt combination, 35 gns. [4759

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Latest Model ROVER, T.T., Philipson pulley, slightly shop-soiled. Makers' cash price £67 10s. Our special price 45 gns. only.

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JULIAN, 84, Broad St., READING.

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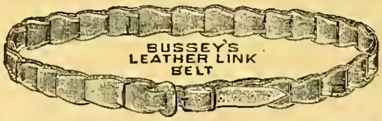

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EAGLES-N.S.U.

2-Speed Gears with Free Engine

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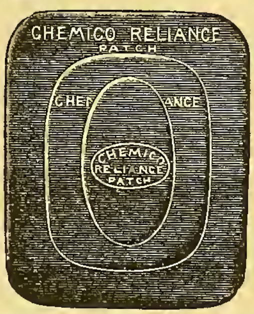

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JAMES, 1917, 2¼h.p., 2-stroke, 2 speeds, lamps and horn; £40.—See below.

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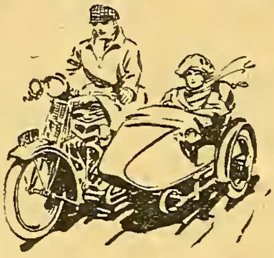

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15h.p. Deasy, in grand order, detachable wheel
ney, good tyres, owner foreign service; ca
or take good make late combination part payment
wanted.—Barnard, Fish Docks, Millford Haven.

WARNE, 1915, 8-10h.p., 3 speeds and reve
axle, Stepney, hood and screen, V twin
water-cooled, guaranteed not done 200 miles;
exchange.—Maudes' Motor Mart, 100, Gt. Portl
London, W.1. Tel.: 552 Mayfair.

WE have the following cars for sale for c
tended payments, or your motor cycle
change: Enfield, Alldays, R.M.C., Morris-Oxfor
ard, Humberette, Morgan, Horstmann, and also
van.—Full particulars on application.—Service C
High Holborn, London.

SWIFT, 1915, 10h.p., 4-cyl., dynamo lighting
wheel, Palmer cord tyres as new, speedome
clock, just been repainted, 2 horns, etc.; excha
ranged on motor cycle or combination; easy pa
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THIS Week we have some real bargains.—12h
gyll 3-seater, dickey, £20; 15-cwt. De Di
solids, runs well, £25; 18h.p. Wolseley 1-ton va
dual, £45; 15h.p. 6-cyl. Calthorpe chassis, goo
pulls well, £50; 25-cwt. F.I.A.T. van, solids
Bosch, Claudel, £50; 14-16h.p. Ballot, torpe
flush-sided 4-seater; 25h.p. Iris lorry, Bosch,
gate, £50; 15h.p. Talbot lorry, dual, gate, 4-spee
Straker-Squire lorry, monobloc, enclosed valves
20-32h.p. Darracq 25-cwt. van, 10ft. 6in. wheelba

THIS Week's Special Bargains.—All dates me
here guaranteed correct.—15h.p. 1912 Stu
torpedo, monobloc, dual, gate, smart, £65; crean
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Zenith, £65; 10h.p. 1914 Adamson sporting cy
4-cyl. monobloc, gate, self-starter, underslung,
line, £75; 15h.p. Germain, torpedo, 3-seater, dick
Zenith, smart, £85; 15h.p. 1913 Studebaker,
monobloc, enclosed valves, detachables, Bosch
smart, £90; 15.9h.p. Arrol-Johnston, torpedo,
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THIS Week.—Dear little Swift cycle car, 40
40 m.p.h., £115; 12-15h.p. Vulcan, 4-seat
closed valves, worm drive, Zenith, £125; 10h.p.
light car, wide 3-seater, 4-cyl. monobloc, worm
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seater, £135; 1915 Horstmann sporting light
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light car, self-starter, dynamo lighting, £150;
Siddeley-Deasy torpedo, detachable wheels,
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let, 7-seated English body, torpedo front, curve
round back, grey cloth interior upholstery, £18
1916 10h.p. Mackenzie 4-seated light car, monob
closed valves, worm drive, Sankey wheels, str
torpedo, £135; late 1913 15.9h.p. Belsize, str
torpedo, enclosed valves, Sankey wheels, 80×150
bloc unit, exceptional condition, £200; 26h.p. Ca
Knight 1-ton platform lorry, about 1915-16, slee
engine, detachable rims very little worn, £250.

THE Motor Clearing House, 6c, Lansdowne Hi
Norwood, S.E., have all the above in stock.
call 9 to 6.30, including Saturdays. No busine
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the two; wants few parts.—Nash, 49, H
Kingston-on-Thames.

3½h.p. Engine, m.o.v., complete, Bosch, B
haust pipe, silencer, perfect; £5/10.—
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9h.p. Twin, water-cooled, side-by-side valves,
engine, hardly used, with Simms magneto
carburetter; £23.—Jamieson, The Braes, Darvel.

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ESTABLISHED IN 1903
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AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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The Non-technical Motor Cyclist.

WHILE looking through the regulations of the newly constituted Royal Air Force, we were astonished to see that motor cyclists are counted as non-technical men, while ordinary M.T. drivers are reckoned as technical men, and consequently get an increased rate of pay. It is not surprising, therefore, to find in *The Motor Cycle* letters of protest against this state of affairs from R.A.F. motor cyclists.

We are quite in agreement with our correspondents' contentions, as it is evident that whoever was responsible for this classification neither understood nor realised the conditions under which an army motor cyclist works. It is true that mechanically the lorry driver has more to look after and a more complicated piece of machinery to understand, but it is certainly more trouble to keep an air-cooled single-cylinder engine in tune and repair, owing to the more frequent necessity for decarbonising the cylinder and piston, than it is a water-cooled four-cylinder motor, which will run for far longer periods without attention; moreover, when the latter needs repair it is given over to a fitter for the purpose, while the motor cyclist must tune and adjust his own mount.

"The least the authorities could do," writes one of our correspondents, "would be to classify us as D.R.'s instead of privates, considering the rough job we have." This seems to be a very happy suggestion, as the R.A.F. motor cyclists certainly deserve recognition, and might well be graded as they desire. "Also," he writes, "why should we not have some distinctive badge to wear, as other motor cyclists in other corps?" Here our reader is in error, as there is no official badge designating a motor cyclist D.R.

So much splendid work has been done by motor cyclists in this war, work which is recognised by officers of the highest rank, that we are sure that if this matter is brought before the authorities it will receive attention. We therefore respectfully urge that the R.A.F. motor cyclists receive the recognition which is clearly their just due.

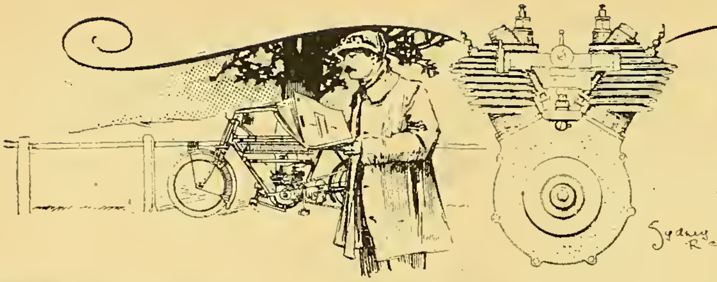
The Choice of Gear Ratios.

A FEW weeks ago—to be precise, on March 28th—we printed, in our Correspondence columns, a letter entitled "A Plea for Lower Gears," and last week another correspondent made out a case for the other extreme. Each writer had good reasons for his point of view. The question is to a large extent a personal one. The top speed enthusiast, who likes to do the major part of his running without changing down, and loves to boast of having climbed Alms Hill "on top," *must* gear low—rather too low, in fact, for the best all-round results. Then, again, an engine which attains its power by means of its "revving" capacity—*e.g.*, many of the flat twins—is well suited to a low gear, and, further, a low gear is imperative when the engine is small and low-powered in relation to the weight, which it often is in the case of a lightweight or of a sidecar outfit.

One rider may love the buzz of a two-stroke or small twin, which is *anathema* to another whose ideal it is to "pobble" along with a powerful engine turning over slowly or to indulge in a burst of high speed at moderate engine r.p.m.

It seems to us that a high gear demands a powerful engine, which, while doing its work at a reasonable speed, is still working well within the limits of its power. Few things are more distressing to the lover of machinery than to hear an engine konking its heart out while climbing a hill on a high gear when a movement of the gear lever would result in not only an easier but a quicker climb. As Aristotle says, the mean state is the most desirable.

An index to the advertisements in this issue will be found on the page facing the back cover



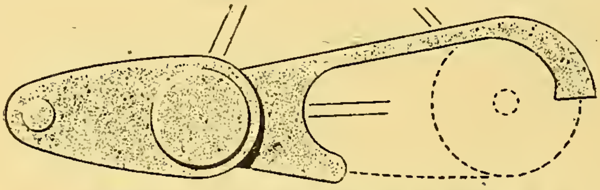
TRANSMISSION SYSTEMS.

Which is the Most Satisfactory?

WITH engines of improved torque, and with workshop practice and advanced knowledge in the use of metals, will the return of the normal order of things see the materialisation of the enclosed shaft drive? It is sincerely to be hoped so, and, viewing the matter from every point of the compass, there is really nothing to exclude its realisation, while there are a hundred reasons why every attempt should be made for its perfection. Its harshness has hitherto been its main stumbling-block, but the employment of an effective shock absorber rules this off the boards, and, in order to make clear its real desirability, let us first review the weakness of existing systems.

Pros and Cons of Chain Transmission.

The serious rival of the shaft drive is calculated to be the all-chain enclosed drive, which, when all is said and done, is far from being a desirable system. Chain cases are costly, difficult to make, and unwieldy. The employment of aluminium castings is the only solution to the problem. Mud and water are bound to find their way into the interior of the cases unless the design and workmanship are perfect, whereupon the casing merely answers the purpose of imprisoning the mud it contains.



A cast aluminium chain case giving total enclosure for front chain and partial enclosure for the rear—a design which "Chinook" holds up as vastly superior to total enclosure unless the latter be on the most costly lines.

Those who have made chain cases know the difficulties; those who have used them are poignantly aware of their shortcomings. The partially enclosed chain leaves much to be desired, but the next solo mount I have will possess, by preference, a countershaft aluminium front chain cover and an open rear chain efficiently shielded, as in sketch. This, in my opinion, is by far the most satisfactory arrangement for solo mounts, and unless manufacturers are prepared to part with the cash, and give us chain cases which will function properly as such, they will do well to give up all attempt at producing the truly weatherproof chain drive, and provide something which will allow us to inspect the chains. The sheet tin guards which to-day deface many excellent machines are a hopeless failure, and of all the enclosed chain drives to-day on the market there is only one (or two at the most) which offers any real return for its weight and encumbrance.

Chain-cum-Belt.

The chain-cum-belt system is worse. It is as harsh as the chain drive, slips when most desired to grip, and is a futile compromise as an engineering proposition. In fine, dry weather one blinds, with the result that one probably over-oils, and the front chain, being only partially enclosed and lubricated from the engine, similarly obtains an overdose, flings it on to the belt pulley, and the belt slips. In wet weather water gets on to the belt by hook or by crook, however good one's mudguarding may be, and—the belt slips. A watersplash inevitably holds one up, and, all things considered, the belt in any shape or form is, in my opinion, a relic of the dark ages, to be shed and left behind as speedily as possible.

Cost and Weatherproofing.

We have, then, two possible systems—the all-chain drive, in which no attempt is made at perfect weatherproofness, the front chain being enclosed in an aluminium cover and the rear chain merely partially enclosed (not necessarily so open as in American practice), and the all-enclosed chain.

The latter, to be really satisfactory, must be a good deal more costly than the shaft drive, while it is certainly heavier, uglier, and more cumbersome. It is far more susceptible to damage than the shaft drive, especially Overseas, while the shaft drive scores on the points of absolute weatherproofness, facility as regards perfect lubrication, longevity and neatness. Does any system present such neatness as an integral unit with its single shaft protruding, to be connected, by a castellated rod, to the simple grease-tight bevel gear box on the rear hub? Accessibility, cleanliness, and simplicity are salient features of the shaft, and though it may be regarded as a knotty problem, it certainly is no more so than is the oil-tight chain case; in fact, it may be regarded as the only system which renders such oil-tightness possible. CHINOOK.

REGISTRATION IN U.S.A.

In the United Kingdom the motoring registrations during the war have steadily declined. In the United States the reverse has happened. During 1917, which was America's first year of the war, there was an increase of 1,396,324 cars and motor cycles over 1916. The total registration in the United States on January 1st, 1918, was 5,000,000, which means that there is one motor vehicle to every twenty people in the country. Two years ago there was one for every forty people. In the British Isles the pre-war ratio was one motor for every hundred people.

OCCASIONAL COMMENTS

By "Ixion"

The Influence of Aero Engines.

A GOOD deal of impetuous nonsense has been talked and printed about the part aero engines will play in the evolution of motor cycles. urely the salient points are quite easy to grasp. Sub-ect to discussion, I submit that they are just two in umber, viz. (1) Aero engines have transformed our chnical knowledge of air-cooling. (2.) Various pes of aero engine suggest improvements in the otor cycle engine de luxe. As regards (1), traders nd users alike must grasp the fact that the half-ozen men who are masters of the design of air-cooled ero engines express the utmost contempt for pre-war otor cycle engines, considered as scientific efforts to et the best results from air-cooling. If this con-empt is not mere good-natured "swank," we may xpect all motor cycle engines to develop a higher fficiency after the war, and the little yarn anent a ertain "stunt" two-stroke, which I printed the other eek, indicates the practical values of these vague evelopments. This factor will influence the whole amut of motor cycling, and should be specially use-l in the lightweight sphere. Baby two and four-rokes should become far more practicable.

The Rotary a Wash-out for Road Work.

ON the other hand, most of the talk about radials and rotaries is probably hot air of considerable temperature and no great density. The rotary a hopeless dud from a motor cycling standpoint. o name a few of its worst blots, it suffers from short roke, acute connecting rod angularity, heavy piston ressure on the cylinder walls, absurd lubrication, aste of power in overcoming air resistance, difficulty silencing, external filthiness, low maximum r.p.m., tc., etc. It would never have been tolerated even n aircraft, but for certain obvious considerations hich balanced these glaring shortcomings *under the pecial circumstances involved.* The war created a emand for ultra-light engines, of great horse-power, mall overall diameter or "swing," and of the mini-num depth from front to rear. Air-cooling offered ttractions in such a specification. The design of a tationary air-cooled engine of enormous h.p. was not hen practicable—perhaps is not yet practicable. Hence the sudden war boom in rotaries. None of the bove conditions apply to motor cycles. The crudest ir-cooled design will give satisfactory results on a ehicle which demands no more than 3½ h.p.; which an make shift with an engine of low m.e.p.; which n normal use is hardly ever run on full throttle, and hat only for the briefest imaginable periods, and which is not at all closely limited in its overall dimen-ions. In my opinion, to put a rotary engine on a motor cycle would be the act of a lunatic.

What About the Radial?

THE radial stands in a somewhat different category. A correspondent treated the technical aspects of the rotary with ability in *The Motor Cycle* of April 4th last: but, to my mind, he completely missed the main practical issues. He was perfectly correct in laying some stress on the question of cost. It is really determinative so far as the bulk of commercial motor cycles are concerned; and in the impoverished world of to-morrow motor cycles as a class will surely tend to become cheaper in terms of £ s. d., or—if the financial situation renders that impossible—specifications will become less luxurious. Prior to the war some of us did not mind what we spent on a machine within limits, but surely it is an absurdity for an individual to spend a huge sum on a machine which is only capable of transporting one person and an extremely sketchy allowance of baggage. The five-cylinder radial must remain more costly than a vertical single or a V twin: and it is not likely to figure as the power unit of the motor cycle for the million. Our contributor, however, overlooked the fact that there was a very distinct and important market for motor cycles de luxe: that this market may revive after the war: and that the engine de luxe for the motor cycle de luxe has yet to be evolved.

Motor Cycle Engines de Luxe.

THIS Sybarite market falls into divisions: (*a*) bicycles; (*b*) cycle cars and sidecars. In the past the trade which coquetted with this market experimented with three types of engine—the big V, the flat twin, and the four-cylinder. The first was badly balanced, had an ugly-sounding exhaust (which really counts quite a lot), and proved inaccessible when jammed into a triangular frame panel. The second was only half exploited when war broke out: is really difficult to house in a motor cycle frame: and is not too readily accessible. The third was even more in its infancy—so far as small air-cooled examples were concerned—than the flat twin: from my experience its wee cylinder caused far more trouble than the bigger cylinders of the V and the flat twin: and accessibility was not one of its virtues. None of the trio had been established as the ideal engine de luxe. The radial is a new and formidable competitor in this special class; where cost within reason is of small account. Its cost disqualifies it for the normal market; I am not saying that a Henry Ford might not produce a five-cylinder radial to undersell all existing vertical singles: but, if Ford achieved this stunt, he could certainly undersell his own five-cylinder radial with his own vertical single. If we add a footnote to the above-mentioned article of April 4th, "The above arguments only apply to the market which can accept engines de luxe," we shall throw it into due perspective.

OVERSEAS SECTION.

A Commentary based upon Practical Experience and a Study of Overseas Opinions.

Tyre Notes. THERE is only one decision possible with regard to motor cycle tyres for use amidst pioneer conditions—that is, the largest and heaviest tyres and rims procurable are none too substantial, and anything smaller and lighter than the largest is apt to prove a source of never-ending trouble.

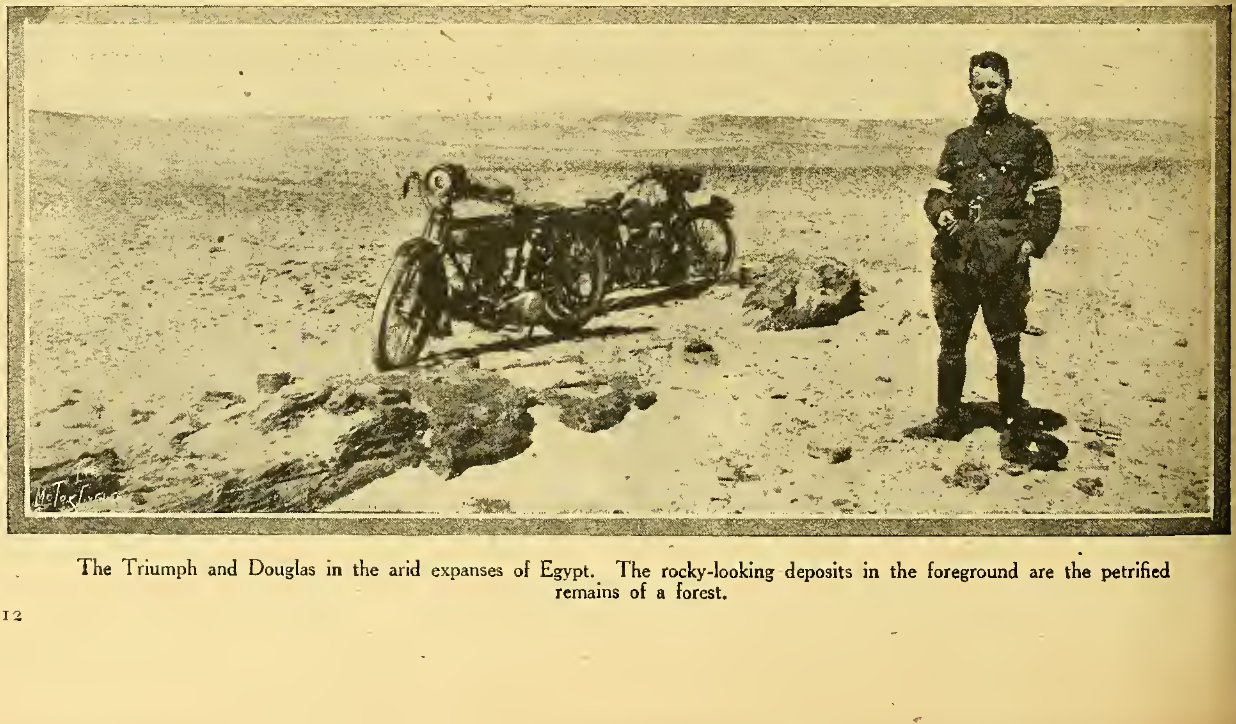
It is a foregone conclusion that 28in. wheels are preferable to 26in. wheels, both for solo and sidecar use, but a very large, "squashy" tyre on a 28in. wheel is not necessary, and is unsafe for solo riding. In sidecar use the best size is undoubtedly 700 x 80 mm., mounted on a flat voiturette rim. Voiturette rims are better for sidecar use, as they provide a greater width on which the beaded edge can lie flat. In solo use the 28in. x 3in. or 2½in. is a satisfactory size, the large wheel bridging the inequalities of the road while the moderately narrow tyre obtains a good grip, and does not roll about between the rim and the road surface as does a 700 x 80 mm.

There are two reasons why the above recommended size can be regarded as the smallest serviceable for sidecar use. A sidecar outfit is usually very much heavier than the solo mount, especially as regards the weight on the rear wheel, and if a 2½in. tyre be used it must be kept so tightly inflated to avoid bumping on the bad patches that one might almost as well be mounted on a solid tyre. Running a tyre board hard, as the makers generally recommend, may be all right as regards the longevity of the tyre, but it is bad for the machine, just as it is bad for the rider. The jolting effect of a board hard tyre on a bad road is terrific, not only tending to shake the whole outfit to bits, but imposing undue snatches on the transmission. We have ourselves heard of gear box troubles originating from the use of tyres so small that it was necessary to run them board hard.

The large tyre, on the other hand, can be run just so far relaxed that a cushioning effect is obtained from it, and, since side-slip need not be guarded against in sidecar use as with a solo mount, the slight rolling that occurs is of no consequence.

* * *

Sidecar Springing. WE would again urge upon makers of sidecars the desirability of employing some method of springing the sidecar wheel. Recently we received a letter discussing this question from a member of our staff now serving with a sidecar ambulance section operating in a hilly sector at the Front, and his opinion was conclusively expressed. Three of the sidecars in his section possess spring wheels, and quite apart from the very considerable comfort derived therefrom, the springing systems have proved the finest antidote for frame



The Triumph and Douglas in the arid expanses of Egypt. The rocky-looking deposits in the foreground are the petrified remains of a forest.

O rseas Section —

b akage yet arrived at. These three machines are t only ones in the section that have not, as yet, sust ned any frame breakages. Those having rigid w eels have all given trouble in this direction. C nerally, it is the chassis that breaks adjacent to its m st rigid part of attachment, and one can thoroughly r lise this state of affairs on contemplating the terrific b ws that are delivered upon the chassis when the s ecar wheel or the rear wheel of the motor cycle c nes into violent contact with some obstruction.

Our correspondent goes on, "If the makers of s ecars could realise what some of the wounded s fer during transportation they would not only fit s ing wheels but would also revise their whole s inging systems. Sidecars are worse in this respect t n they were five years ago—our stretchers being unted in much the same way as the ordinary touri g bodies. We want not only spring wheels, large t es, and good suspension, but in my opinion every s decar turned out, whether for the Army or home u e, should be fitted with a friction shock absorber erating between the body and the unsprung portion, so as to damp out the terrific rebound. With us it is necessary always to carry a man on the carrier to steady the stretcher—*i.e.*, prevent the rebound by the application of his hand, for it is this quick recoil and snatching motion which cause so much suffering to the wounded. Damp it out, and the stretcher rides perfectly."

Our correspondent is unquestionably right, and what applies in his locality applies with equal strength in all regions of rough roads. The tendency in sidecar springing seems of late to be to employ shorter and stiffer springs, which by no means give maximum comfort. That a friction shock absorber, placed as our correspondent suggests, would enormously improve matters, cannot be doubted, for even if the hood be erected the wind resistance acts in much the same manner, steadying the rebound, and thus adding to the comfort of the vehicle by preventing the springs from attaining their full range in either direction.

The sidecar de luxe, then, should possess a spring wheel, a well-sprung body, and at least one adjustable shock absorber; given these it would rival the Rolls-Royce for luxury of motion.

A Selection of Letters from Readers scattered all over the World.

English Machines in N.S.W.

Mr. J. H. Anderson, Nowra, N.S.W., comments as fl ows: "The article you published on mountain climbing i N.S.W. was illustrated by photographs taken by myself. e boy in the photograph is my brother, who has been led, hence this letter. We (he and I) have been most i erested readers of *The Motor Cycle* since we started with tor bicycles a little over three years ago; consequently were both delighted to see our own machines illustrated it. He said in a letter home that he had seen the page ile in France. I have often thought I should like to ngratulate you on your splendid journal. Unfortunately, ing to the submarines, several copies have gone to the ttom lately—one particularly, which I would have liked see, containing a description of the latest Brough.

'In the photographs sent my mount was the magneto gined Rover, which I used for nineteen months and then d for £87 10s. It cost me £110 new. I now have a gneto engined King Dick, put together by Messrs. Bennett d Wood, of Sydney. It is fitted with S.A. gear, and is a st serviceable mount, although not fast. I "barrack" for e English machine every time, but I do not know whence y next mount is coming, as there are no English twins ming out. I find it pays me best to use a machine for elve months or so and then sell, as one can always get a od price if one looks after the machine.

"I wish your journal the continued success which its to-dateness deserves."

American Machines in Canada.

Mr. W. R. Warne, Toronto, Canada, writes us again as llows: "In writing the letter which you kindly published October 25th, 1917, my sole motive was the hope of ousing some interest on the part of British manufacturers the Canadian motor cycle market. Whether I succeeded ems doubtful. Anyhow, the offer to furnish information, ith which I concluded, elicited only one solitary response. resumably, our friends of the trade are possessed of all rticulars, or was my charge of lethargic indifference more lly justified than I imagined?

"'W.G.,' late Triumph agent in Toronto, questions my sertion regarding the preponderance of American machines Canada. He then proceeds to remind me of a *pre-war* mpetition in which *out of seventy contestants only two, or ss than 3%, rode British machines.* Surely these figures nfirm my contention? I fear, moreover, that this very low atio would have to be considerably reduced were similar mparison applied to ordinary road conditions.

"Evidently, 'W.G.' did not read my letter very carefully. o far from 'swearing by American machines,' I am so little nterested in them that I have never ridden one. Furthermore, the remark that 'the $3\frac{1}{2}$ h.p. Triumph is regarded as a lightweight, fit for city use only, was clearly expressed as representing, not my opinion, but the impression prevalent among local riders. Again, I did not utter a syllable criticising either agents or British motor cycles. The former are helpless and deserve sympathy, and the latter command my unstinted admiration, it being my fervent wish that I may, as soon as circumstances permit, see them replace the American product in the affections of Canadian motor cyclists. This, unfortunately, is not likely to occur unless British traders wake up.

"'W.G.' suggests that English makers have lost money in attempting to capture Canadian business. I do not doubt this, but predict that their losses will continue unless they adopt entirely different tactics. They must realise that in 'entering the lists' for Canadian trade they have to engage in conflict with very doughty opponents. For each concern to attempt to establish one-man shows here and there is to invite failure.

"It seems to me that the only course at the beginning for those to follow who intend to compete with the Americans is to get together and work out some co-operative scheme, or, better still, form a subsidiary company with headquarters (showrooms, stores, workshops, and offices) in Toronto—the English centre as well as the commercial hub of Canada—branches in Montreal and the western capitals, and carefully select agents throughout the provinces. Special attention should be given to creating an efficient service system, and prices of spares and accessories should be protected."

Why no English Machines in the Far West?

A letter from Vancouver strikes a rather original note, and the writer—Mr. M. T. Eddie—has certainly succeeded in leaving us rather befogged as to how far he is in earnest. He says: "I have seen several copies of your paper, and must confess I have enjoyed them all, but do they really make motor cycles in England? I ask, because none ever seems to reach us out here, and if they are so good, so well finished, so powerful, and so reliable, surely we on this side, to say nothing of our 'Frisco neighbours, deserve to be given the chance to test and appreciate a good thing. And I have generally found that anything worth having is always to be seen and had in 'Frisco, but English motor cycles do not find a market there.

"It rather makes us think of how the Austrian Ambassador described to his Government American efforts for the war—'Two-thirds advertisement and the other third bluff.' That is what we think of English motor cycles, for we cannot understand why, if they are so good, we do not get a chance of proving their merit ourselves."

A NEW TWO-STROKE V TWIN ENGINE.

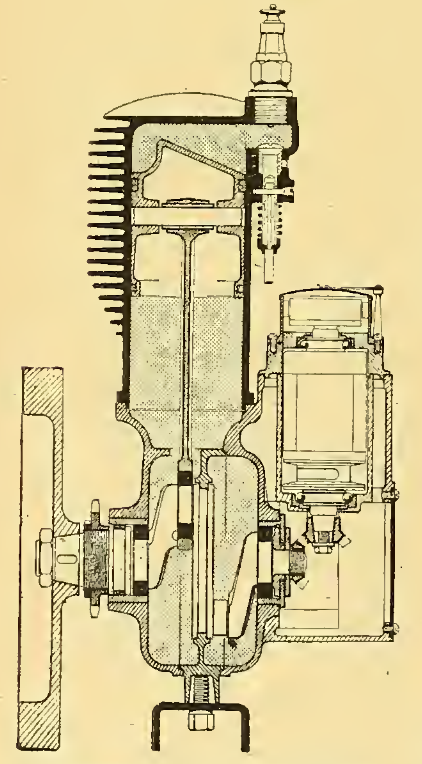
Incorporating a Magneto with a Vertical Armature, and an Ignition System in which the Engine Piston itself plays an Important Part.

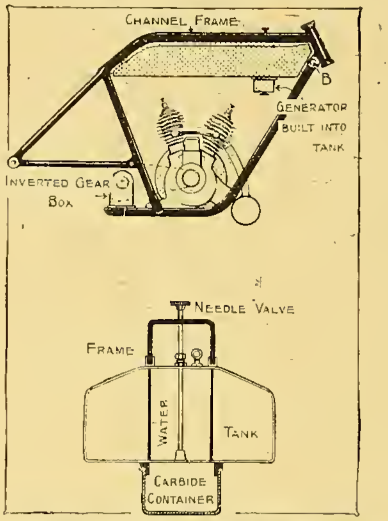
IN spite of the stress of war, we frequently receive, even at the present time, particulars of new and interesting designs. Below we describe practically in the words of the designer—Lt. R. W. Richards, A.S.C., M.T.—what seems like a promising new engine and ignition system.

The engine is a V twin two-stroke, having the cylinders set at an angle of 45°, while the cranks are placed so that even firing, good balance, and even torque are obtained. The two crank cases are divided in half, and the two sides are rendered compression tight by a piston ring gland, which has proved to be quite successful in practice. There is practically no wear at this point as the ring is stationary, and there is little or no tendency to press against the side of the groove in the crankshaft.

The cylinders (which are 60 mm. × 60 mm.) are slightly staggered, so that the back cylinder has a better chance of keeping cool than if both were in line, while roller bearings are provided on the big ends and on both sides of the main shaft. The piston is provided with three rings—two at the top in the same groove and one at the bottom.

One of the most novel features of the engine is the arrangement of the magneto. The magneto is quite standard, so far as its essential features are concerned, but it is carried in a housing cast integrally with the crank case, and the position of the magnets relative to the pole pieces has been altered—that is to say, the armature, instead of running horizontally between the magnets, is placed vertically between them, the magneto being placed with the poles facing upwards. The magnets are a permanent fixture in the housing, so that if the magneto requires attention the armature and contact breaker complete may be removed, a keeper placed over the poles and the magnets left *in situ*. The drive is by means of a bevel, and, of course, is entirely enclosed in the housing.


Sectional view of the twin two-stroke engine, with "vertical" magneto, described in the accompanying article.



The construction of the channel steel frame and the acetylene generator arrangements.

Another point of interest is the compression release, which is direct acting, the valve being controlled by a Bowden cable, and there are no levers or links to cause trouble. It is so placed that when the compression release is opened cold air rushes on to the plug points.

It is intended that a Claudel carburetter should be fitted to this engine, which should render it quite flexible—in fact, an experimental machine built before the war with this type of engine showed great flexibility and economy.

The Frame Construction.

The frame, contrary to general motor cycle practice, is to be of channel steel, and the power unit, together with the gear box, will be mounted in the manner shown in the sketch. It will be seen that the crank case does not, according to usual motor cycle design, form a bridge or portion of the frame. This tends to greater strength, and also renders the whole power unit most accessible, so that it can be quickly lifted out and placed on the bench.

The cross section of the frame and of the tank shows the manner in which it is proposed to carry the acetylene generator. It will be noted that if the pins A and B are removed the whole power unit together with the gear box can be tal away without disturbing the adjustm of a single part.

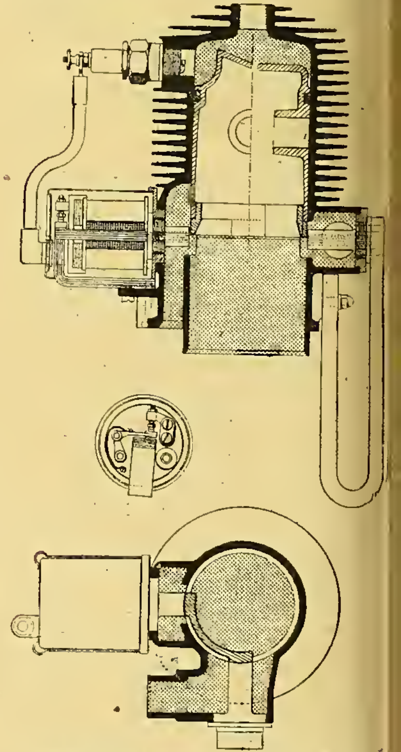
Such attempts as Mr. Richards made in his design to depart f standard practice with real improvem as the end in view most certainly dese encouragement, as motor cycle des has been far too prone to follow development of standard practice in past, and far too little originality been shown.

An Alternative Ignition System.

It is not only in the design of the eng that Mr. Richards's fertile brain has b working to bring about improvement.

In designing an alternative ignit system he has aimed at obtaining cheap, compact, high-tension igniter a two-stroke engine, the operation of timing of which is effected by the pist moving past the ports in the cylind thus doing away with the moving pa found in the ordinary magneto, and, course, the small amount of po absorbed in the magneto drive. In apparatus he has maintained the sa magnetic and electrical conditions as to be found in a stationary armature ty of magneto, except that the lines of fo in this case are cut by an inductor movi in an up and down motion instead of a rotational one.

In his endeavour to get rid of as ma moving parts as possible the designer


The ingenious ignition system shown in vertical and horizontal sections. (Inset) Details of contact breaker.

A New Two-stroke V Twin Engine.—

arranged that the contact breaker should be actuated magnetically, breaking the primary circuit at the proper instant—that is, when the maximum number of lines of force are passing through the coil. He has not yet actually tried this ignition device; and a magnetic contact breaker may be somewhat uncertain in its action, so he has conceived the idea of a mechanically operated contact breaker on the crankshaft, but he does not like the idea, as it would interfere with the beautiful simplicity of the original design. He pointed out to us that with the magnetically actuated device it would be possible to design the engine with an overhung crank pin, similar to the Veloce or experimental Levis, which would permit of easier stamping and machining of the crank for a roller bearing big end.

Piston Details.

The piston would be of aluminium alloy with a Swedish iron inductor attached to the skirt, for the two-fold purpose of directing the magnetic lines of force from the magneto through the core of the small coil and for conducting the heat away from the piston head more quickly.

The ignition is, of course, timed by the passage of the piston over the gas ports in the cylinder, and is thus made definite. An ordinary magneto has to be driven in order that the armature may cut the lines of force in the magnet, and this means that chains, chain wheels, platforms, adjustment, and fixings are necessary, while the weight must also be taken into consideration, but with this scheme the means to cut the lines of force are provided by the piston, which performs the same functions as an ordinary two-stroke piston, except that the inductor in the skirt controls the output of current in addition to controlling the inlet and outlet of gases in the cylinder.

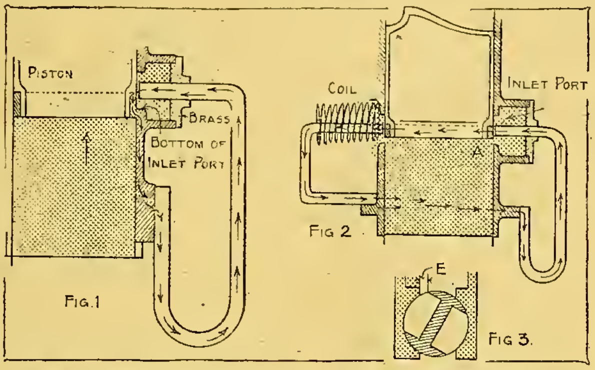


Fig. 1.—The direction of the lines of force just before the piston uncovers the inlet port.

Fig. 2.—The direction of the lines of force when the piston has just passed the bottom of the cylinder port. This position corresponds to that of the armature in an ordinary magneto, as shown in fig. 3.

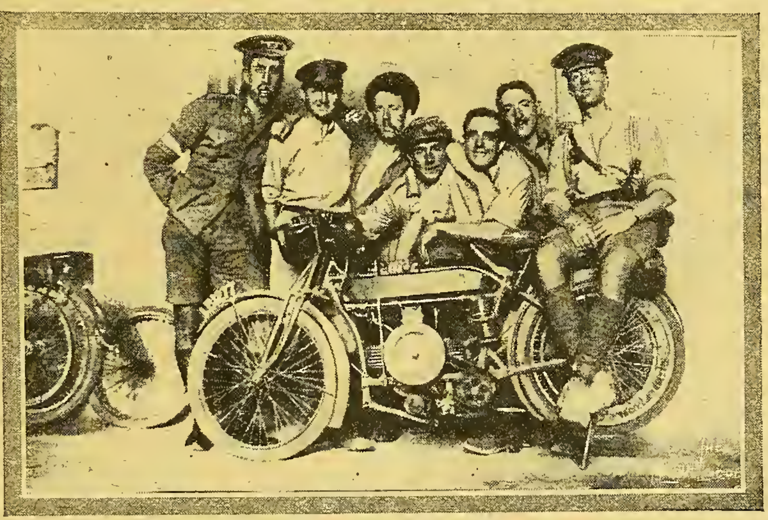
The most vital parts of the system—that is, the high-tension coil and the contact breaker—are situated in a dry place, behind the transfer port, and the only other criticism which we have to offer besides that of the magnetic contact breaker is that the high-tension winding would be, we fancy, rather too much subjected to heat from the engine, and would necessitate very careful insulation of the core winding; but these two points have not escaped the attention of the designer.

Another point of interest is that no accurate machining would be required to obtain a small air gap round the armature, as this is accomplished by the ordinary course of making the piston a correct fit in the cylinder. Moreover, the timing cannot slip. If the stroke is increased and the inlet port is made deeper, the firing point is brought about the same angle early as with the shorter stroke. Thus, no matter whether the stroke is long or short, the firing point is not affected.

◆

FINE GAUGE WORKMANSHIP.

MANY manufacturers of motor cycles make a boast of the fact that they work to an extremely fine limit throughout the manufacture of their machines. This principle, of course, is excellent, but it would be a thousand blessings if they would aim at a design that would not necessitate an extremely fine limit. If the design is such that extremely fine workmanship is necessary, then the machine, whatever it be, will not wear so well as one which is so designed that fine workmanship is not necessary. Let us employ limit gauges, by all means, but do not let us depend upon them for the reliability and longevity of our machines, so that, immediately the initial newness and perfection of fit wears off, new parts are necessary. I do not refer so much to engines. In any reciprocating machine fine workmanship is essential, but there are other units in the construction of a otor cycle where it is not essential. ke, for example, the gear box. cently I have seen a good many gear xes—all of the same design, ample, omy, and, in many respects, of excel- nt design. But, under the conditions warfare, they have given trouble—simply because the designer of the box has not allowed a sufficient margin for wear. The dogs are too shallow, the striking mechanism too accurate, and the necessity for fine workmanship too painfully present in every part. The result is that, immediately the initial newness—I had almost said stiffness—wears off, trouble begins. We usually reckon that they wear four months, after which period it is necessary to renew the dog clutches; at the end of seven months they must be renewed again; and at the end of nine months the wear throughout the box, though not great, is sufficient to render it of little use to renew odd parts. It is necessary then to overhaul thoroughly the whole gear box.



A merry group of despatch riders in a garage in the Suez Canal zone.

These gear boxes are amply roomy for a wide margin to be allowed for wear, so that, when the parts become somewhat slack, the reliability of the unit is not endangered; and these facts apply not merely to one individual make, but to almost all. There is no reason why such an article as a gear box—and the same applies to other units—should not wear indefinitely, its life being determined, first, by the allowance made for wear in its design, and, secondly, by the quality of the material of which it is made.

It is up to the designer, then, to get away from the vital necessity for fine workmanship, and, by so doing, he will not only produce a more reliable article, but he will be able to produce it at a lower price.

Price alone should prove an adequate incentive for making the change, even if there were no other advantages to be gained.

H.M.B.

RECOLLECTIONS OF AN OLD FAVOURITE.

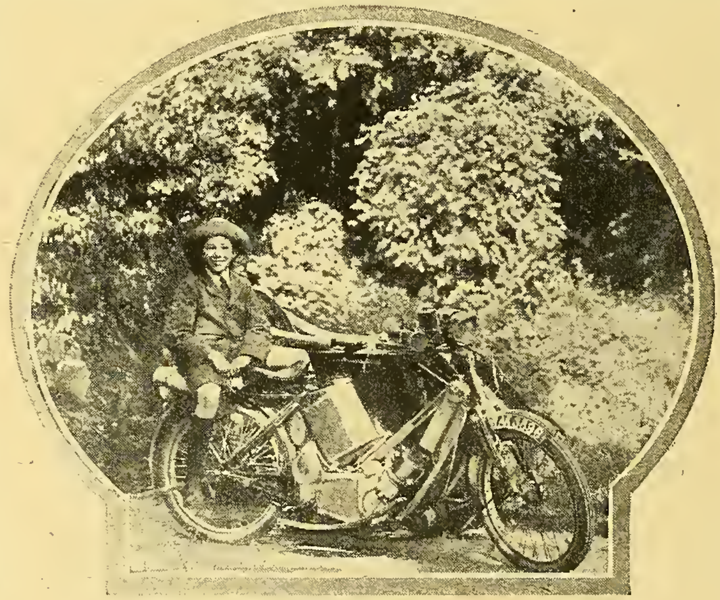
An Appreciation of a Motor Cycle which appeals both to Expert and Novice alike.

ONE needs, perhaps, to be a bit of a specialist in order to appreciate a Scott motor cycle to the full. Like absinthe and other inequalities in life, it grows on one. Perhaps because of its superlative comfort and sheltered riding position, perhaps because of its delightful control and balance, or perhaps because rule of thumb tactics simply do not apply in the case of the Scott, I have always regarded it as my favourite among a chosen few. A certain wily flat twin, a 2¾ h.p. T.T. single, and indeed one T.T. 3½ h.p. single—a type which to-day I eschew—are all fragrant memories, yet of the many scores of machines I have possessed—personally or on extended journalistic trials—the Scott affords the happiest recollections.

I do not mean to infer that such possession was an unblemished field of daffodils—far from it. If the water boiled it was merely a little diversion by the way. Why did the water boil? One recalled that all last winter one had ridden without a front wheel mudguard, owing to the latter having dropped off late in the autumn—and on what machine but a Scott could one do such a thing?—and that even with the radiator chock full of mud the water had never boiled. Why, then, should it boil this fresh April evening?

Probably one never found out. It never did the same thing again. That is the delightful part about a Scott. One concocts one's own little theories for the wayside mysteries that crop up, and in the meantime they automatically vanish.

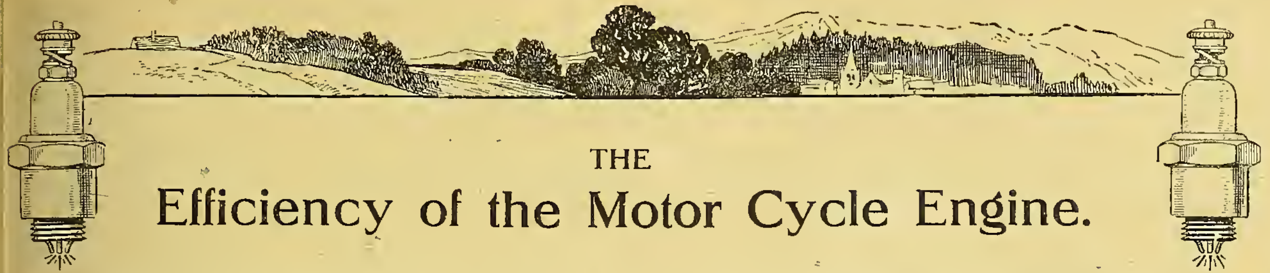
The Scott machines I have possessed all afforded endless incident and endless scope for exercising one's skill as a tuner. No machine yields a better return for careful tuning, adjustment, and alignment, but in the hands of an uninitiated rider a Scott can give trouble. It is a sportsman's machine, and if given gentlemanly treatment always responds in a gentlemanly manner. Endless attention is not necessary, as the following will prove.



The Scott combination on which some of the writer's most enjoyable experience was derived.

In 1912 my mount was a Scott, and that last happy possession certainly did not receive the attention its breed demanded. At the time I was very intimately associated with the outdoor press, and life was an absolute hurly-burly, spent chiefly on the road between Scotland and the West Riding—mountainous roads for the most part, fog, rain, and sunshine. Journeys of 130 miles per day were regular—500 miles per week in straight trips, as a rule—with a few twenty and thirty mile spins thrown in. The Scott was never cleaned, never tuned. The chain alignment and tension were carefully watched, and the oil-can used liberally. No time for anything else. Rust accumulated, things dropped off, the mudguards rotted from their anchorage, there was nothing left of the horn but the trumpet, and one of the footboards was missing. The makers hid their blushes, and implored me to submit the machine for an overhaul, but not much. I could pin my faith absolutely to that Scott, and trust to keeping timed appointments, but not so on a borrowed mount. I knew I could always start third kick, day or night, and reach my journey's end without fatigue—two points of very great importance. And so I kept on riding it till the silencer dropped off, till one could fit threepenny bits into one or two of the engine bearings, but still no breakdown. That, then, shows that, though a Scott responds to decent attention, and must, under any circumstances, be understood by its rider, it can be set down as a mount of unwavering reliability.

It must be borne in mind that this machine has remained unchanged save for minor refinements for some years, and that in the post-war model present weaknesses will probably be eliminated. It is to be hoped that more substantial bearings will be employed and a perfected system of lubrication. Personally, I regard the Scott as a most delightful machine, and one which appeared years before its time, and I look forward to its further development with the keenest interest. C



THE
Efficiency of the Motor Cycle Engine.

IN view of the present interest displayed on the value of the various fuels which can be used in connection with internal combustion engines, the following remarks may prove of value in showing what a remarkably small fraction of the theoretical or ideal h.p. can be obtained from the most modern type of motor cycle engine.

The first thing to consider is the ratio of the theoretical amount of work it would be possible to get from a given engine to the actual amount. This is called the *thermal efficiency*. It is now necessary to define two things in determining thermal efficiency:

1. The British thermal unit, which is the amount of heat required to raise the temperature of 1 lb. of water at its maximum density (*i.e.*, at 39° F.) through 1° F.

2. Calorific value. The calorific value of a substance is the number of British thermal units (or B.Th.U.) which will be liberated by 1 lb. of the substance when it undergoes complete combustion.

Now the calorific value of ordinary commercial petrol is about 20,000 B.Th.U., and as 1 B.Th.U. is the equivalent of 780 ft.-lb. of mechanical work, 1 lb. of petrol should, if all the heat be used up, give 780 × 20,000 or 15,600,000 ft.-lb. of mechanical work.

Supposing the engine consumes .6 lb. of petrol per b.h.p. per hour (which is a good average), then .6 × 15,600,000 or 9,360,000 is the number of ft.-lbs. of mechanical work done. Also a horse-power is the power exerted to raise 33,000 lb. one foot in one minute, or 33,000 × 60 or 1,980,000 ft.-lb. per hour, then the ratio $\frac{1,980,000 \times 100}{9,360,000}$ is the actual thermal efficiency—*i.e.*, about 21%.

Thus, approximately, only one-fifth of every gallon of petrol used is converted into useful work, the rest bringing about overheating, burnt valves, sooted plugs, and other attendant troubles well known to the motor cyclist.

So much for the losses due to the improper use of fuel.

The next question is that of indicated horse-power.

It is obvious that this is some function of the force exerted on the engine piston during the working stroke (in the case of a four-stroke engine) and the distance travelled by the piston in feet per minute.

If D = diameter of the piston in inches,
s = stroke in feet,
n = number of revolutions per min.,
P = average pressure exerted on the piston,

then the force exerted on the piston is

$$\pi \times \left(\frac{D}{2}\right)^2 \times P = .7854D^2 \times P,$$

and the distance travelled by the piston is $2sn$.

Now since the power is only transmitted to the piston through one stroke out of the four, we must divide the product of these two quantities by 4, thus—$\frac{.7854D^2 \times P \times 2sn}{4}$, and for normal running the distance travelled by the piston ($2sn$) is about 1,000 ft. per minute, and P the average pressure on the piston is about 80 lb. per sq. in.

The i.h.p. is then equal to

$$\frac{.7854D^2 \times 80 \times 1,000}{4 \times 33,000}, \text{ or } .47D^2.$$

For an average single-cylinder engine D is equal to 85 mm. or 3.34 inches, so that its i.h.p. is $.47 \times (3.34)^2$ or 4.72.

Now according to the well-known rating, the brake-h.p., or the h.p. exerted under load, is taken to be only 80% of this value, which then becomes 3.77 b.h.p., which is probably what a good 3½ h.p. (nominal) single develops.

From the foregoing remarks an interesting comparison of fuel value can be got by noting calorific values, which for the most common fuels in present use are:

Paraffin	21,500 B.Th.U. per lb.
Benzole	18,000 ,, ,,
Alcohol	10,000 ,, ,,
Coal gas, about ...	550-650 B.Th.U. per cu. ft.

It does not, of course, follow that the fuel with the highest calorific value is the best to use in connection with internal combustion engines, and very frequently their combustion is attended with the formation of other compounds which may interfere considerably with the mechanical efficiency of the engine. For instance, paraffin, even in the best circumstances, is likely to leave a large deposit of soot which, besides clogging up various parts of the engine, becomes incandescent during continuous running, seriously pitting and burning cylinder, valves, piston, and exhaust pipes.

The question of efficiency has only been discussed as far as the power delivered to the crankshaft is concerned, as the losses in the transmission on a modern motor cycle are quite small.

The chain, of course, is the most efficient form of transmission, and if well lubricated is often as high as 98%. With the belt, however, it is probably only 80%, as the useless work done by the engine in conforming the belt to the engine pulley is considerable. This is quite easily understood when one tries to bend a length of 1in. belt normally in contact with the pulley round its periphery. The efficiency of the shaft is a very variable quantity, and, of course, normally involves that of two pairs of bevel pinions. Generally, it is in the neighbourhood of 93%.

W.K.A.

Times to Light Lamps.

SUMMER TIME.

April	25th	8.39 p.m.
,,	27th	8.41 ,,
,,	29th	8.46 ,,
May	1st	8.50 ,,

Water Cooling.

The improvements made in air-cooled engines during the war may retard the development of the water-cooled motor cycle.

Post-war Demand.

Provided fuel is available at a reasonably low price, it is anticipated that the post-war demand for motor cycles will be many hundred per cent. greater than it was before the war.

The Spring Frame Problem.

Closely allied to the problem of the spring frame on a chain-driven machine is the question of ratio of sprockets of the final drive. The sprockets should be of equal size.

April Days!

The weather during the week-end was most remarkable, even for our undependable climate. First rain, then snow, and afterwards more rain fell for thirty-six hours or so. In happier days the weather would have done something towards marring several sporting events, but we imagine that this time it made but little difference to motor cyclists.

Imports and Exports.

As was the case in February, only one motor cycle was imported into the country last month, its value being £31. Tyres and accessories were received to the value of £3,488. Compared with the imports of March, 1917, there is a decrease in total imports of £40,721.

EXPORTS.

Exports show a decline compared with the corresponding month last year, as might be expected :

	1916	1917	1918
Number of machines	1,093	988	258
Value of motor cycles, parts, etc.	£80,328	£78,850	£32,593

The New Army Type Indian.

The first of the new Army type Indian motor cycles was seen in London last week. Six foot of khaki-clad Sammy, with the engineers' hat cord (red, piped with white), was piloting it through the Strand. He did not seem to find much difficulty in insinuating it through our dense traffic, for all its right-hand sidecar. The outfit was finished in a very pale khaki, almost cream, and the Indian name on the tank was done in bold but inconspicuous coloured lettering. The sidecar body was very ugly in outline, but serviceably constructed, and the chassis was secured by five extremely hefty-looking connections. The equipment was entirely American, and embraced none of those concessions to European taste with which we are familiar. The saddle was a Troxel, rather strangely shaped, and of the colour of a buttercup. Compressed gas lighting, and Remy ignition, so far as could be gathered, completed the equipment.

Workhouse as Motor Cycle Repair Depot.

"The Workhouse," as it is still known, at Grove Park, near Bromley, has certainly seen some changes since the earliest days of the war, when it was a mobilisation depot for several hundred motor 'buses and impressed lorries. Since then thousands of M.T. drivers and despatch riders underwent training from the depot, which later became the discharge depot for A.S.C., M.T., men invalided out.

Now it is a Women's Legion depot, and a number are seen on motor cycles and sidecars (P. and M.'s, etc.), and doing work formerly performed by cars. Part of the workhouse has recently been equipped for motor cycle, car and tank repairs. A four-cylinder car engine provides power. Most of the motor cycles used by the women riders in the London district receive attention here.

Special Features.

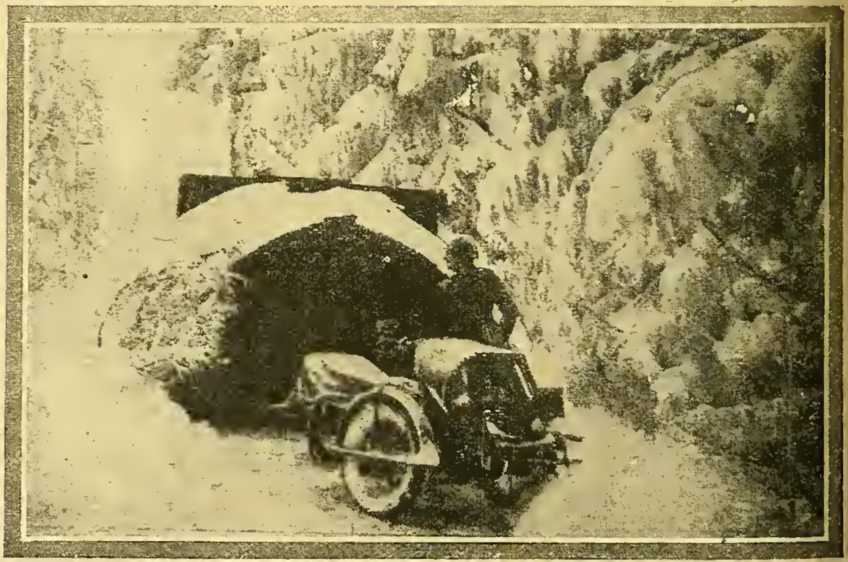
A NEW TWO-STROKE ENGINE.
COMFORT IN RIDING.
EFFICIENCY OF THE MOTOR CYCLE ENGINE.

Motor Cyclists Wanted.

The County of Middlesex Motor Volunteer Corps, Central Group, requires a number of motor cyclists to bring the corps up to full strength. The work they will have to do is of a very interesting and important character, and cannot fail to attract every keen and patriotic motor cyclist. Full particulars can be obtained from Mr. K. Ballard, County of Middlesex Motor Volunteer Corps, Central Group, 406, Euston Road, London, N.W.1.

Woolwich Sale of "Unserviceables."

An auction sale of "unserviceable" ordnance stores, advertised to take place this week at Woolwich, includes three motor cycles, a car, eighty-three magnetos, 2,500 outer covers, and hundreds of tons of old wood, iron, rope, canvas, and rubber. A correspondent says that the motor cycles are probably disabled and ancient "war worns." At the last sale one "lot" was an ancient tricar. The sale opens on the 25th inst. at the Co-operative Hall, Parsons Hill, Woolwich.



A striking photograph taken on the French Front, showing the conditions under which the sidecar ambulances work. The driver of the Sunbeam ambulance at the mouth of his dug-out is a late member of the staff of *The Motor Cycle*.

F ur Cylinders?

Vhich will be the next British motor c le concern to introduce a *de luxe* four-c inder machine?

E ctrical Equipment.

An electrical expert predicts that the r tor cycle of the near future will have a combined ignition, lighting, and start-i set.

S e of War-used Motor Cycles.

At a sale held in Paris on the 8th i t., a number of motor cycles were p up for auction, and fetched various p ces ranging from about £3 up to £19. A British machine (a Royal Enfield) f ched the highest price, a Moto-Rêve c ning second, and a Motosacoche third. venty-five sidecars were knocked down a less than £1 each.

M ed Metaphors.

The following sentence occurred in an a icle recently sent in to us by one of c most popular and respected con-t butors: "To do so is merely like p ting new cloth into an old bottle, for t new part finds any weak spot in t old and the rent is made worse." S cely Mr. De la Roche, M.P., must b either turning in his grave or going g en with envy!

M tor Cycles Help the Shortage of Doctors.

So many doctors have been sent Over-s s to join the Army that there is a great shortage of medical men in ronto. A military court of enquiry s recently held to investigate the state affairs, and it was finally decided to ure two Indian motor cycles and side-s for the use of doctors in making t ir calls. These motor cycles are rowed from the R.F.C. and are driven members of the Canadian Army edical Corps. In cases of emergency sidecar outfits may be employed in ing patients from homes to hospitals. ore motor cycles will be provided in e course by the military authorities.

Racing Classes after the War.

As the 500 c.c. engine may be dropped by the majority of firms in favour of the slightly larger engine, will the T.T. and Brooklands racing classes be revised to suit the altered conditions?

Infinitely Variable Gears.

The infinitely variable gear for motor cycles is a fascinating problem to many inventors, and so long as we have motor cycles on the road there always will be cropping up designs for variable pulleys, friction gears, and hydraulic clutches.

Six-cylinder Motor Cycles.

At least one private designer has a six-cylinder V engine in course of construction. So far the time consumed on the work amounts to 163 Saturday afternoons and fourteen Sunday mornings. The cylinders are 60×60, the total capacity being 1,020 c.c., and the complete engine will occupy less room in a frame than would a four-cylinder Henderson.

A Motor Cycle "Coal Cart."

In Norwich, Connecticut, in the early part of this year there was a coal famine, and for some time it was impossible to buy coal in quantities exceeding 100 lb. or 200 lb. per family at one time. The retail dealer could not, of course, undertake to deliver such small quantities. An Indian motor cycle agent in the town had an idle sidecarrier outfit of this make, and it then occurred to him that he could be of some service to the community, and he announced that he could deliver small quantities of coal for a nominal sum. The "nominal sum" each customer paid for the delivery not only paid all the working expenses but left quite a considerable amount as profit. It also was a good advertisement for the agent, and there is no doubt that hundreds of the inhabitants of the town now testify to the value of his services and the efficiency of the machine, which ploughed faithfully through the very worst of the winter weather, bringing relief to their cheerless homes.

The Ultra-lightweight.

Who will be the first designer to produce a 60 lb. motor cycle?

Engine-gear Unit.

At least one flat twin enthusiast has succeeded in embodying a change speed gear within the crank case of a flat twin—on paper.

Types.

Generally speaking, all motor cars follow the same practice except in minor details. In motor cycles one can almost say that no two are alike.

Road Schemes.

Several municipalities have town re-planning schemes under consideration, and no doubt the question of motor traffic will be considered in due proportion to its importance.

The Lady's Machine.

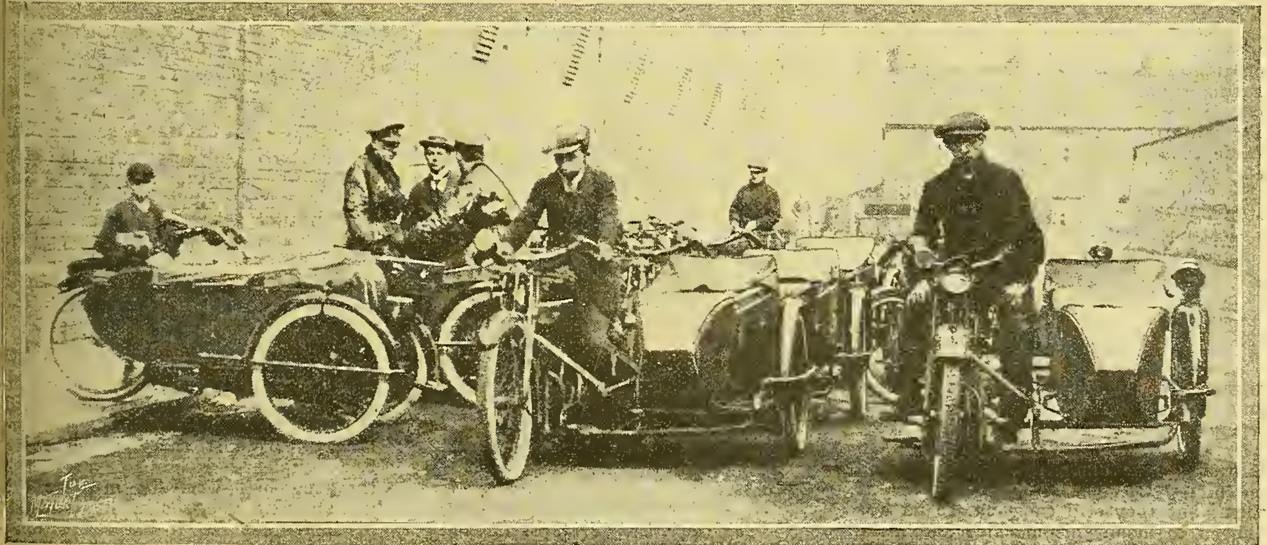
The lady's model of the future probably will be more a specially designed machine than an adaptation. There are now sufficient numbers of fair riders and potential riders to induce designers to give them attention.

New Blood.

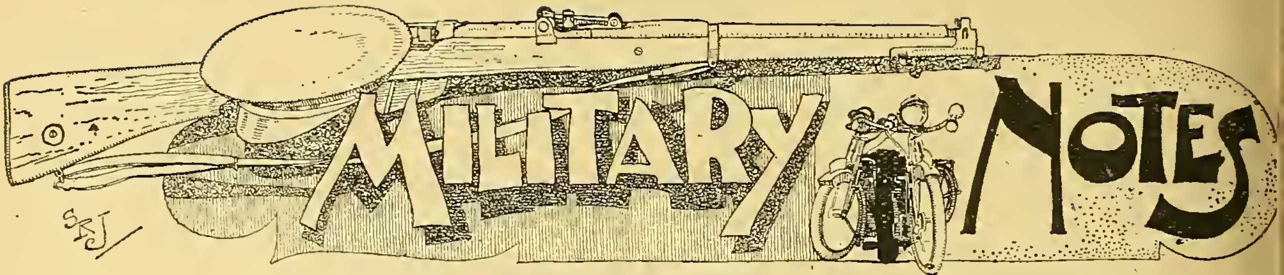
The war has brought into the motoring world quite a large number of men who may never have been interested in a motor vehicle. Men of many trades are in the R.A.F., and quite a large number will endeavour to retain their connection with the internal combustion engine.

Motors at Holiday Resorts.

A correspondent, recently in North Wales, informs us that that motorists' happy hunting ground is now almost pathetically bare of any form of motor other than the regular 'buses. In Llandudno, for instance, he saw on an average, one car per day in ten days. Last year, at Easter, the average was more like one hundred than one, in spite of current restrictions.



A group of 4 h.p. Douglas sidecar outfits, destined for war service, about to undergo a road test before delivery. Mr. S. L. Bailey, of Douglas Bros., is seen in conversation with the two officers in charge of the test.



A Calling-up Muddle. Belgian Honours for Motor Cyclists.

THE AUSTRALIAN METHOD.

ELIGIBLE men in the Australian Government Department are to be replaced by returned soldiers.

* * *

BRAZIL COMES IN.

A NUMBER of Brazilian officers and soldiers are demanding permission to form part of an expeditionary corps to fight on the French front.

* * *

LOST PARCEL MAILS FOR MALTA.

THE Postmaster-General announces the loss at sea, through enemy action, of parcel mails for the hospitals and fleet at Malta, containing parcels which reached the General Post Office, London, for despatch about February 20th last.

* * *

QUEEN MARY'S W.A.A.C.'s.

AS a mark of Her Majesty's appreciation of the good services rendered by the Women's Army Auxiliary Corps, both at home and abroad, the Queen has been graciously pleased to assume the position and title of Commandant-in-Chief of the Corps, which in future bears the name of Queen Mary's Army Auxiliary Corps.

* * *

MOTOR CYCLING ELECTRICIANS' CALL-UP CANCELLED.

AN example of man-power muddling was provided recently at a famous electrical firm in the S.E. district, where a number of skilled employees, including electrical tool makers engaged on magnetos and other electrical fitments, received a call-up to report at short notice for military service. The firm at once made representations that the men were engaged on urgent and vital work, and the call-up would result in the entire stoppage of important work. The notice was at once cancelled.

* * *

MOTOR CYCLIST CHASED BY AIRMAN.

THE *Daily Mail* correspondent recently met a transport waggon which had been machine-gunned by an enemy airman and a motor cyclist who had had an encounter with the Germans. He was trying to rescue two wounded A.S.C. men who had been hit from the air, when Germans came along the road and fired on him. He emptied his revolver at them, but they still came on, so he was obliged to mount his machine and make off all out. It is not often that a D.R. goes into action, and such a contingency is only possible in open warfare.

THE TOLL OF WAR.

ONE of the many gallant officers who have given their lives for their country in the recent offensive is the late Maj. S. J. B. Lacon, Royal Warwickshire Regt., attached A.S.C., M.T. He joined the Forces as soon as hostilities broke out, serving as a despatch rider in the Royal Warwickshire Regt. when defending the east coast, and later was granted a commission, and became attached to the A.S.C., M.T., on account of his extensive knowledge of motoring.

Lacon was a member of a well-known Norfolk family, was educated at Eton, and from his very schoolboy days took a lively interest in motor cycle matters.

He had a curious meeting not very long ago while at the Front. Lt.-Col. D. F. Nicholl, a vice-president of the A.C.U., who is in command of a heavy artillery group, wrote and told us that he had come across an enthusiastic motorist in the M.T.—"an A1 officer," to use his own words—who was the major in charge of the transport which served his guns with ammunition, little realising that he had found in the said major (who was, of course, Lacon) a distant cousin.

After his early motor cycling experiences, Lacon became more and more enthusiastic over motoring, and largely forsook the motor cycle for the car, though he never entirely gave up his old love, having owned a $2\frac{3}{4}$ h.p. New Hudso just before the war. He became inte ested in a garage in Ahingdon, in co junction with his brother, and took u the agency for Palladium cars, on whic vehicles he achieved considerable succe in competitions on Brooklands track. H was a fine fellow, a capital sportsma and very popular. His work in th A.S.C., M.T., was excellent, and hi rapid promotion was a clear testimon of this.

The late Major S. J. B. Lacon, Royal Warwickshire Regiment, attached A.S.C.,M.T. He joined the forces as a despatch rider in the former regiment.

* * *

DISCIPLINE!

IN the battalion orders of a famou regiment, under the heading of "Di cipline," it is stated that "men's hai will be cut evenly all over the head, an a fringe is not to be left in front."

* * *

CONTROLLER OF TRENCH WARFARE.

THE Minister of Munitions ha appointed Brig.-Gen. Arthur Asquith, D.S.O., to be Controlle of the Trench Warfare Department of th Ministry in succession to Maj.-Gen. T. M. Bridges, C.M.G., D.S.O., employe on special duty.

* * *

HONOURS FOR MOTOR CYCLISTS.

THE following Army motor cyclis have received the Croix de Guer from the King of the Belgians Cpl.-Motor-Cyclist E. J. Abbott, R.E Cpl.-Motor-Cyclist G. A. Bellamy, Sgt Motor-Cyclist H. Pennington, R.E., an Cpl.-Motor-Cyclist T. Philbrin.

* * *

BELGIAN RECRUITING BOARD

BELGIAN subjects who have bee posted by the Belgian Recruitin Boards or Appeal Boards to Gro 5 will enter active service on June 1s 1918. Those who have not by May 15t 1918, received their calling-up pape should inform Le Service de la Mobilis tion, 8, Lupus Street, London, S.W.1.

* * *

A DESPATCH RIDER'S BRAVER

AN example of bravery and fortitu is afforded by Pte. William Griffi Carnarvon, now in a Lond hospital. Whilst carrying despatches bomb exploded within six yards of hi throwing him from his machine. N withstanding the shock, he crawled his hands and feet to his destination a delivered the message safely, subsequent tumbling in a helpless condition into friendly dug-out.

THE MOTOR CYCLE
AVIATION SECTION

The enormous importance of the Air Service needs no emphasis: it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouraging of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

A Gallant Frenchman.

Lt. Foncb, a French airman, has achieved his twenty-seventh victory.

◆

The First Mechanically-propelled Aeroplane.

The first aeroplane to fly by mechanical propulsion was made by an Englishman named Henson, who in 1843 flew under the power of a 20 h.p. steam engine.

◆

Keenness.

An officer who had but recently been in receipt of his commission, and before joining the Army was in a West End business, was on leave in London when the offensive started. Since he could not find means of returning to the Front quickly enough by the usual train and boat route, he proceeded to the nearest aerodrome, and there found a pilot who was taking a machine across to France; thus he obtained a lift which brought him back to his regiment the same night. The curious part of the story is that he had never been in an aeroplane before.

◆

On Streamlining.

Why do not our designers pay much more attention to the very important point of streamlining? The Huns have done so with marked success. At present many of our machines leave much to be desired in this respect. A certain machine of French make, when redesigned and properly streamlined, increased its speed 10-15 m.p.h.; and the same h.p. engine was fitted in both cases. The original machine had quite a good streamline, too.

One cannot help wondering at the intricacies of some people's minds, on seeing a machine with the engine in a neat cowling tapering almost to a point, and no "pot" on the propeller to give harmonious lines throughout!

An Early Bird.

Archytas (400 B.C.) is said to have made an artificial bird of wood, which flew by flapping its wings, but no further details have been handed down concerning it.

◆

AIRMEN MOTOR CYCLISTS

The name of Lt. Ivan B. Hart-Davies, R.F.C., who was killed whilst flying last summer, will be remembered by thousands of motor cyclists. Hart-Davies was an enthusiastic motor cyclist and the holder of the John-o'-Groat's and many other long-distance records. He also competed in the Tourist Trophy Race of 1912. His records were accomplished by the aid of a wonderful vitality, combined with determination to wrest the coveted record from all comers. He was a most successful business man, a thorough sportsman in every sense of the word, and was probably one of the oldest pilots to obtain his "wings" during the war.

Lt. Ivan B. Hart-Davies, R.F.C., who was killed whilst flying.

An Appointment.

Mr. Bertram Jones is appointed Civil Assistant to the Controller-General of Equipment in the Air Ministry.

◆

Honour for Chatham.

Capt. McCudden, V.C., D.S.O., M.C., M.M., the airman, is to be presented with a testimonial by the borough of Chatham, of which town he is a native.

◆

New Chief of Air Staff.

Maj.-Gen. F. H. Sykes, C.M.G., has been appointed Chief of the Air Staff, Royal Air Force, on the resignation of Maj.-Gen. Sir Hugh Trenchard, K.C.B., D.S.O.

◆

New German Aeroplane.

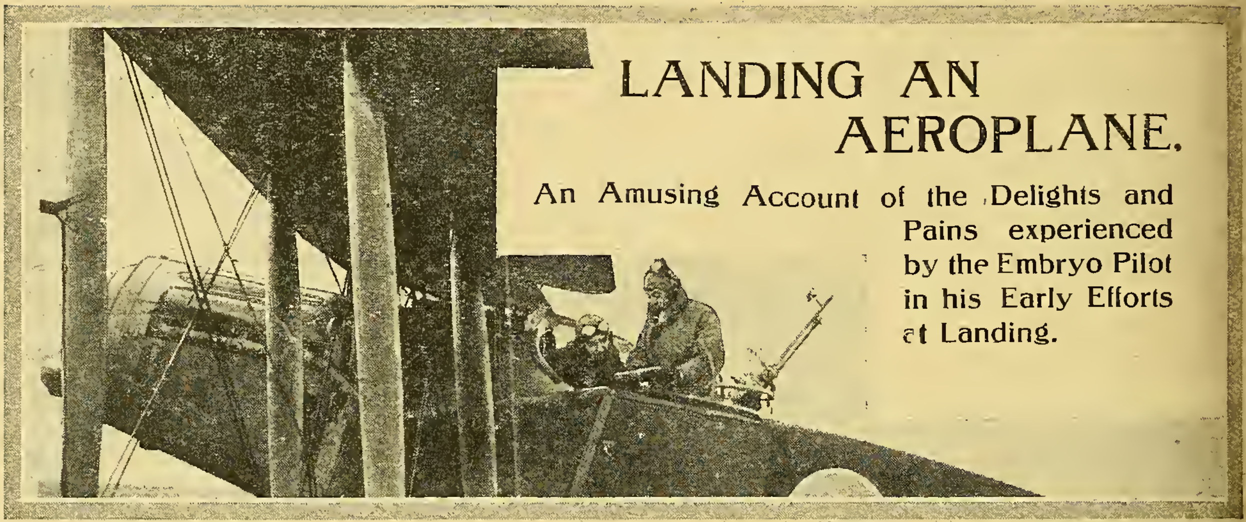
A new German aeroplane, Pfalz III., has appeared at the Front. It is a single-seater chasing machine, and is less than 30ft. wide with its wings spread. Its *débuts* were not lucky, as it appears to lack ascension speed. Two Pfalzes have already met their fate.

◆

The New Uniform.

Several people have been seen wearing the new uniform, and opinions are various. The loss of the Sam Browne belt is universally deplored, as nothing looks smarter, though it may be a bit of a nuisance. The jacket is merely a militarised golfing coat. The hat is quite the best part of the whole, with its elaborate gilt badge.

How many people will wear turned down trousers? Will the dictates of fashion prove stronger than all the Orders in Council ever printed—let A.P.M.'s come in their thousands? Blue trousers do not look so bad turned down, but khaki——! It may be news to some even now that "slacks" are supposed to be worn "unturned up."



LANDING AN AEROPLANE.

An Amusing Account of the Delights and Pains experienced by the Embryo Pilot in his Early Efforts at Landing.

FLIGHT has many surprises for the motorist. The first and perhaps the greatest of them is that landing, which looks so safe and easy, is the trickiest part of the whole business. It is not every motorist who can judge distances so beautifully that he can bring a fast car to rest at a given point without using his brakes.

In bringing an aeroplane down to earth we have, first of all, to judge our height approximately at the commencement of the slanting glide which is intended to touch ground where a good run-off will be left. Then we have to make this glide dead in the teeth of the wind, if possible; partly that the wind resistance of the planes when flying speed is lost may give us some braking effect, but more lest a puff of side breeze at the last instant may jolt the machine at right angles to her gliding path, and rip off the splayed undercarriage sideways. Finally, we have to flatten out of the glide at the last moment: and to time this perfectly is almost a matter of inches. If we leave it much too late the 'bus will stand on her head at 50 m.p.h., cartwheel over on to her back, and very possibly kill her crew. If we leave the flattening out a little later still, she will concertina her nose, and not improbably impale the pilot on the crankshaft. If we flatten too soon, she will flop to ground with a bump which will bash and strain every joint in her.

The First Forced Landing.

Few pilots ever forget their first forced landing. The engine begins to splutter in mid-air, and finally subsides into silence. No spacious aerodrome, with staring windmarks, is handy. You gaze frenziedly round. You are just high enough to have a fair choice of fields from which to select. You are over agricultural land, not crossing the East End, mercifully. You are cute enough to know the breeze in your face is the slipstream of the propeller, and to notice by the blue trail of the chimneys beneath that the pukka natural wind is blowing in quite a different direction. You remember that corn and hay always cause a crash, and stare earthwards till you spot a field which is undeniably carpeted with short turf. You notice with a shudder that a brook along one edge of it apparently indicates a steepish slope, and hastily pick another field. You suddenly see this field is fringed by trees which may be tall, and select yet another field. You begin handling the controls jerkily in your anxiety not to overshoot the field: for as the engine has gone "dud," you cannot rise and make a second shot. At last you land, tremulously, rejoicing no instructor was watching, but in safety.

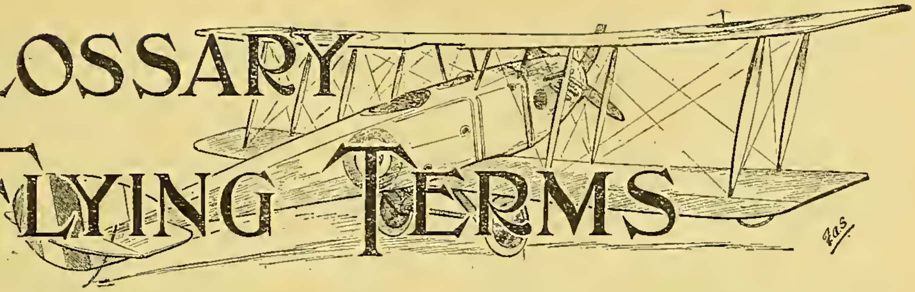
In France.

Then you are transferred to a scout squadron, and commence to learn landings all over again. At last you can make the tyres of a 130 m.p.h. scout kiss the turf like a shy lover: and you go out to France.

No. It is not a back garden. It is not an allotment. It is the aerodrome. It is *our* aerodrome. Yes, we land in it. Yes, you have to land in it. Do people ever ram that hedge and ditch? Rather.

You begin to wish you had gone in the infantry. Landing a scout on this lilliputian aerodrome reminds you of trying to drop a vegetable marrow into an egg-cup from 15,000ft. You go up. You "land"—at least, you call it a landing. The irate Squadron-commander has other words for it, which he recounts faithfully, whilst the mechanics pick the *débris* of what was once an aeroplane out of what was formerly a hedge. At last you, too, manage to land in it. You drop from highest heaven like a plummet. Just before you and your machine are about to be resolved into matchwood and mangled entrails, you cock the 'bus's snub nose impudently heavenward. Down comes her tail—with not too much of a bang, if you are lucky. Her tail skid bites deep, as the undercarriage flops to earth. The spread planes catch the head wind, and soak all the run out of her. She scurries forward a little, and stops short of that eloquent gap in the hedge. You least of anyone can understand why you are not well on the way on a much longer flight, but the fact remains you can't be because you burn your fingers as you light a cigarette with your last match. A fortnight later you think nothing of it, and join in roasting the latest arrival from England, who can't sleep at nights for thinking of that hedge.

A GLOSSARY OF FLYING TERMS



Our articles on "Flying Facts and Theories" have become so popular and have excited so much correspondence that we have decided, in the interests of those motor cyclists who are not very familiar with the names given to the various parts of an aeroplane and other terms used by the Air Services, to publish a glossary of these terms. The explanations, where it seems desirable, will be illustrated by drawings.

SPECT RATIO (SEE FIG. 1).

A designer finds that each wing of a
ntemplated machine must possess 120
uare feet of lifting surface. He can
range the required area either in the
rm of a long and narrow plane, say
ft. × 2ft., or of a short, broad plane,
y 30ft. × 4ft. The width of a plane
om end to end is called its "span,"
d the depth from front to back its
chord." The ratio between span and
ord is the "aspect ratio." In actual
actice an aspect ratio of about 5 or
to 1 is adopted. It is only the fore
rt of a plane which engages still air:
e air engaged by the rear portions of
e plane is disturbed, and consequently
ords less lift. At the same time it is
possible to obtain the desired curvature
the plane and the strength of structure
thout a chord of appreciable length.

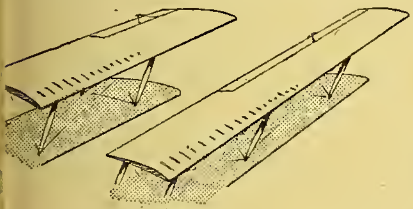


Fig. 1.

VION.

The official name for a military aero-
ane in the French Army.

NK.

To tilt an aeroplane sideways in making
turn. The necessity for banking will
cur to any motor cyclist who will
agine the result of trying to make a
arp turn on his machine while keeping
e machine vertical, especially if he
members that 45 m.p.h. is a low
inimum speed for aeroplanes and that
eeds of over 150 m.p.h. are attainable.
ntrifugal force will cause either a fast
otor cycle or a fast aeroplane to skid
twards from the centre of a sharp
rn. Fig. 2 shows an aeroplane flying
raight, turning on the flat, and banking
rrectly. The centre figure indicates
at as the machine skids sideways, its
anes skid sideways through the air, in
dition to being thrust forwards at the
r. In other words, they do not fully
gage the air in the manner for which
ey were designed; consequently they
not provoke a proper reaction or
tain full lift. In a very bad skid they
ay cease to get any lift at all. On the
her hand, if the machine is banked, as shown on the right, centrifugal force is still trying to fling the machine outwards from the centre of the turn: but the "flat" or underside of the planes is now opposed to the mass of air into which centrifugal force is trying to fling the machine, and a considerable resistance is thus set up.

To put the matter in another way, when an aeroplane is flying straight forward, the chief unfriendly force is gravity, which endeavours to pull it vertically downwards, as shown by the line A B in fig. 2. When the aeroplane turns to the right a second unfriendly force, namely, centrifugal force, tries to fling it in the direction of the line C D. The resultant of these two unfriendly forces acts along the line E F, and by "banking" the machine the full resistance of the planes is concentrated at right angles to the line E F.

BAROGRAPH.

An altimeter which records its readings, *e.g.*, with indelible ink on a paper roll. Such a record will automatically register the altitudes attained during the whole course of a flight. Sealed barographs are used in attempts to break the altitude record.

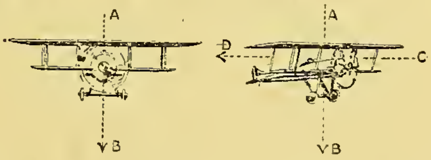


Fig. 2.

BAY.

The square enclosed by a couple of struts and the members to which they are attached. A bay is therefore, properly speaking, a square. The term is sometimes used loosely instead of the term "cubical bay" or "cell," which implies four struts, and the portions of plane or fuselage enclosed by them. The portion of a biplane wing shown in fig. 3 exemplifies the point. In strict accuracy, A B C D is a "bay," and the cube A B C D E F G H is a "cell" or a cubical bay, but the word "bay" is not infrequently applied to "cells," especially when used of the divisions of a fuselage. A B C D is the "outer bay," and C D J K is the "inner bay" of the wing.

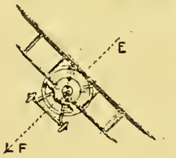
BIPLANE.

A heavier-than-air machine with two main lifting surfaces set one above the other.

Briefly speaking, as it is the front of the plane which gives the machine most of its lift, it pays to use a high aspect ratio. Great span compels the use of very heavy spars in the wings, so that where high aspect ratio is required it is better to distribute the span over two or three comparatively short wings, rather than to use one pair of very wide wings. On the other hand, the more planes we use the more struts and bracing wires we need, and the greater becomes the drift; also, the increased number of planes may interfere with the field of vision, and, in the case of a military machine, with the field of fire.

BOOM.

The chief fore and aft members of the "open" fuselage of a pusher machine; their full name is "tail booms." They are usually constructed of steel tubing, as opposed to the wooden longerons of a tractor fuselage, and they are widely spaced at their front ends to afford clearance for the propeller (see fig. 4).



BRACING.

The use of struts and wires to transfer stresses from point to point. Thus in fig. 5 the whole spread of the wing is provided in order to lift the fuselage F in the centre; and the "lift" is transferred from point to point along the wing by the strats S S S S and the flying wires W W W to the fuselage.

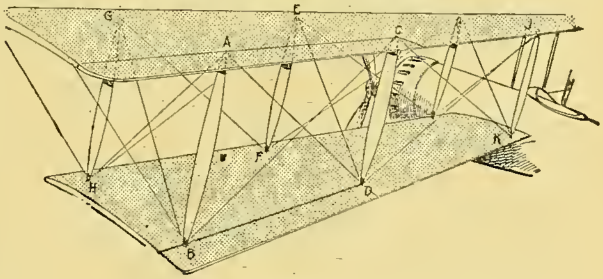


Fig. 3.

A Glossary of Flying Terms.—

CAMBER.

The curvature of a lifting or controlling surface.

CAVITATION.

From "cavity": the tendency of a propeller to carve out a hole in the air, as it actually would do if the air were not a fluid medium.

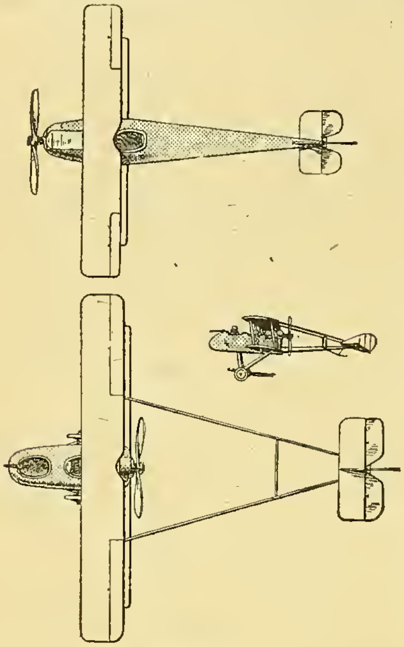


Fig. 4.

(Top) Tractor. The two lower drawings show the pusher type of aeroplane.

CENTRES.

Centre of Gravity.—The centre of weight: the point about which the aeroplane would balance if it were suspended.

Centre of Drift.—The centre of resistance. Applied to a single part or surface, it means the point at which the resistance of that part or surface acts or balances. When we speak of the centre of drift of a complex structure, such as an aeroplane, we are speaking of what is called a "resultant," *i.e.*, the various drifts caused by all the planes, struts, guns, passengers, etc., "result" in a total drift which centres at some discoverable point in the front elevation of the machine. In a similar way, of course, each part of the aeroplane has its own private centre of gravity, and the centre of gravity of the complete machine "results" from the total and disposition of the weights of the parts.

Centre of Pressure.—A line running from the outer edge of one wing to the outer edge of the other wing, on which the air pressure balances. The centre of pressure in a complete aeroplane is, of course, a "resultant" of the centres of pressure of the various surfaces, and may be an imaginary line at right angles to the fore and aft axis of the fuselage.

Note on the Various "Centres" as affecting Design.—Two of the above centres are practically stationary in any given machine. The centre of gravity can only vary if weight is dropped overboard or transferred from one part of the machine to another. For this reason bombs and fuel are carried as close to the centre of gravity as possible. If several 112 lb. bombs or an eighty gallon petrol tank were mounted on the tail or near the wing tip, the balance of the machine when loaded or unloaded would be ludicrous. The centre of drift is tolerably stationary, since the machine is designed to be symmetrical in a head- view. It is, however, possible for t centre of drift to shift when the machi is subjected to wind pressures striking at an angle: and advantage is taken this fact in various attempts to secu automatic stability.

The centre of pressure differs fro those of gravity and drift in bei extremely mobile. Consider, for exampl the position of the centre of pressure the sheet of notepaper shown in fig. (February 14th, page 156). As t centre is a line, not a point, in fig. it will be the front edge of the pap and in fig. 2b it will be a line dra across the paper half-way up. In fig. the centre of pressure (or "C.P.") w be nearer the top than the botto

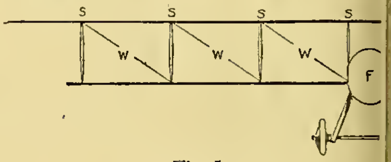


Fig. 5.

because the front edge of an inclin surface engages undisturbed air. Co paring these three sketches, it is cl that the C.P. moves backwards do the surface as the angle of incide increases. The mobility of the C. is utilised to obtain stability agai pitching, rolling, and yawing, as w be explained in the definitions "Stability."

CHORD.

In geometry, the straight line joini the tips of an arc: so, in aeronautics, straight line drawn from the leading front edge of a plane to the rear trailing edge.

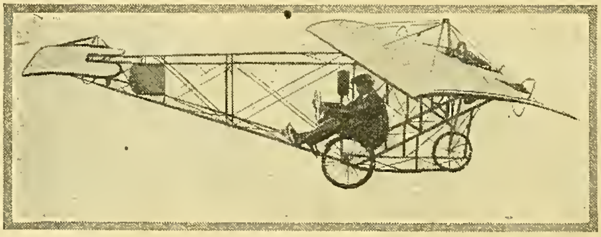
"Pleasure" Flying after the War.

A Motor Cycle-plane within the Reach of All who can Afford a Motor Bicycle.

WHEN the war is over it is prophesied that flying will become popular, and that the Air Service will claim for its own many of the young men who, before the war, were keen competition motor cyclists. There will be private aeroplanes also. Young motorists with means may prefer an aeroplane to a Rolls-Royce car, and motor cyclists probably will experiment on their own account to produce a machine for themselves. Some enterprising manufacturer may evolve a "Ford" type flying machine for the masses, and flying stations may be built near every large town. Conservatives of a past generation may shake their heads, but if one asks any of the younger generation—boy-men who are now war pilots—the reply is a vigorous affirmative.

At present aeroplane engineers are concentrating upon the development of the high-powered gigantic battleplanes and small and faster scouts. There may come a time, however, when the popular lightweight type of aeroplane will be considered seriously—as a small affair equipped with a motor cycle engine.

It must be remembered that some of the early flights were achieved with planes fitted with engines of quite low power, while A. V. Roe, one of the most persevering pioneers—an ex-motor cyclist, by the way—used a J.A.P. motor cycle engine.



A miniature monoplane, the working drawings for which are advertised in America for 8s. 6d.

In America an aeroplane designer is already appealing to the motor cyclist by extensively advertising working drawings, sold for about 8s. 6d., for maki a small monoplane which, it is claim develops a speed of 35 to 60 m.p.h. w an ordinary 7-9 h.p. motor cycle engi

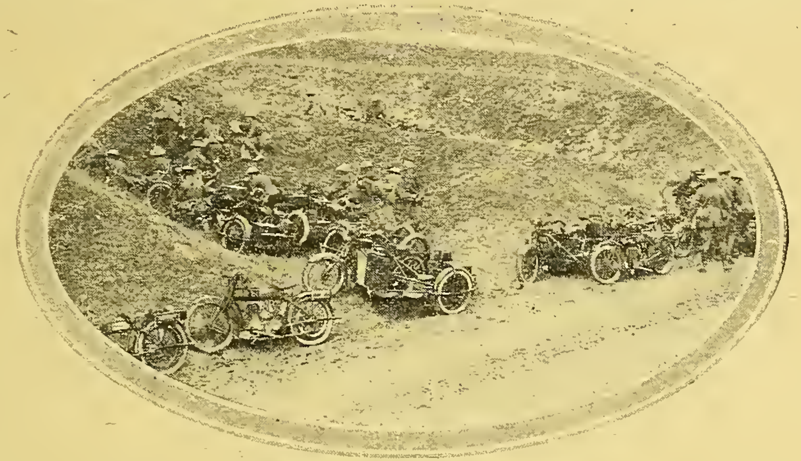
It is said that with these drawin and a shed, barn, basement, or ba yard large enough to assem the machine, it is possible construct this machine with other tools than a saw, hamm and a pair of pliers. The fra is of wood, and the wings be detached in a few minut The length of the fuselage 16ft. One of the American chanical journals states that t machine is "undoubtedly smallest successful monoplane the world," while another jo nal asserts that the inven "has solved the problem producing small machines a cheap price for universal service."

As will be seen from the illustrati the machine somewhat resembles gliders of ten years ago, and, if it only rise a few feet from the grou such a machine would no doubt aff a large amount of excitement.

THE REAL MOTOR CYCLING.

How the M.M.G.'s fought a Five Days' Rearguard Action. By "Gunner."

IT was in January, 1915, that the first battery of the Motor Machine Gun Service landed upon the shores of "sunny" France, and up to March 22nd last no Service had been more misjudged. No one ever suggested that it was inefficient in any way, but, after various attempts by G.H.Q. to use what they knew was a valuable fighting force, many people in military circles had come to regard the Motor Section of the Machine Gun Corps as a "wash-out." That is as far as they were intended to be used, viz., as a mobile force. At Neuve Chapelle, Hill 60, Loos, and Cambrai, the M.M.G.'s were in action, but the Vickers-Clyno combinations always got so far, and then difficulties arose and guns had to be dismounted.



Motor machine guns in a sunken road in France.

The withdrawal from Cambrai to Albert gave the Service its chance, and, to the credit of those responsible, they utilised it to the fullest extent. From the moment the decision to retire had been made, until Albert was reached, the M.M.G.'s were always in the front—or should it be the rear when a rearguard action is being fought?

Checking the Germans.

I cannot give details of the experiences of all the batteries concerned in checking "Jerry's" headlong rush, but some incidents from the diary of one of them may interest our readers. They will prove that the Army's confidence in the usefulness of the motor cycle in modern warfare has not been misplaced.

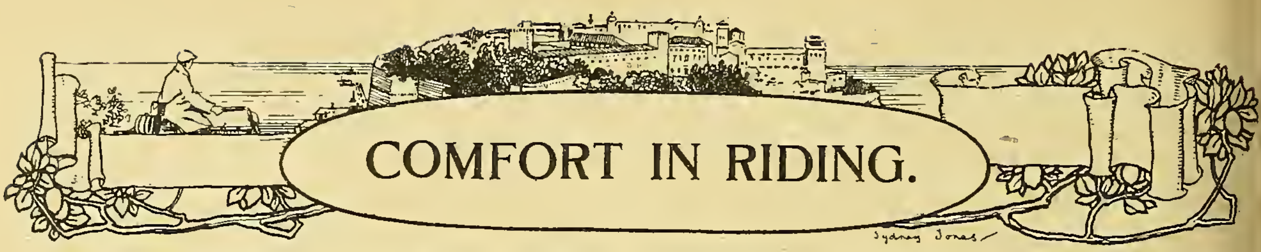
At two o'clock one morning we were coolly informed that we were to proceed to —— Road, that the only troops of our own in front of us were a few stragglers, and that the Germans were to be held there. The battery scout on reaching the spot challenged some moving forms in front, and instead of hearing the familiar English he heard the "zip" of a bullet by his ear. Engines were shut off with some haste, and guns rushed off the bicycles into position. Shots were exchanged in the dark, more for moral effect than actual destruction, and daylight found both guns and bicycles neatly "camouflaged." The next development was on the flanks, and "out of action" was given just in time to save our skins and, incidentally, our guns. This occurred on two more occasions that same day, and each time the bicycle responded nobly.

The most exciting moment of the lot came the following morning, the 23rd. All our guns were mounted on a ridge, with the Clyno combinations hidden on the road at the back of it. Dawn revealed the fact that the infantry in front of us were gradually withdrawing. Nearer came the Boche, and those who were not actually on the guns anxiously examined carburetters, felt tyres, cleaned plugs, and everything to ensure that the first kick on the kick starter should set the engine throbbing. As Fritz came over we gave him his leaden rations until the boys in front had got clear. Again our danger came from the flanks—a fact which was brought to our notice by a machine gun enfilading us from the right. When this danger was increased by a daring Boche sniper, our C.O. deemed it expedient to give the enemy our place in preference to our company. "Out of Action" sounded. By the time the guns and ammunition were on the bicycles, all the engines were throbbing except one. Bullets were "phizzing" to some tune, and clutches soon got busy. Luckily, we had a descent in front of us, and the driver whose "'bus" was stuck was saved by shoving the Clyno along in second gear when it started. Halfway down the hill one of the passengers received a piece of shell in the head. Jamming on his brakes, the driver pulled up, and lifted the dead man off. The machines succeeding him did some exhilarating swerves, but presence of mind saved the situation. Several machines were "winged," but nothing serious happened to hinder the progress of the battery, which took up new positions further in the rear to await another exciting chase.

Saving the Loaves.

A very amusing incident happened in the next stunt. It was a case of neck or nothing again, and as the bicycles were flying along a bend in the road revealed a ration dump left behind by our people. Despite the fact that Jerry was on top of our heels, every machine pulled up. Loaves and milk were thrown into the sidecars. Drivers had only time to slip the gears into neutral before they were in first again.

The whole five days were occupied by such incidents. Machine guns travelled hundreds of miles by the aid of the motor cycle. The Germans by now must have a distinct regard for weapons so mobile. Our own infantry in the past have been slightly amused to see the "motor" machine guns beside them, but when trenches vanish and open warfare prevails the full significance of the word "motor" is revealed.



COMFORT IN RIDING.

Is the Comfort of the Rider primarily dependent on the Position due to the Construction of the Machine or to that of the Saddle?

IT is all very well for "Chinook" and kindred souls to write about "Riding Position" and adjustable handle-bars, twiddly footboards and wonderful saddle-pillars that will slide up and down at a wink from the owner, so that when he comes to sell his ten-year-old mount it will just fit any prospective purchaser. But I am going to be original and unconventional, and claim that real riding comfort is not to be obtained mainly through any of these suggested remedies for present defects in the physical well-being of the owner of an average-sized machine.

Instead of worrying over the height of the saddle above the ground or above the footboards, and the space allowed for the rider's legs or the angle at which his arms are compelled to do their all-important work, why does not someone call attention to the saddle itself? I am sure that what one sits on is really of far more importance as regards one's comfort than is the position one is forced to take up—provided, of course, that this latter is not allowed to reach absurd lengths of discomfort. We can all sit on a straight-backed chair with a soft cushion underneath us for far longer periods of time than we can comfortably endure an elegant lounge on a hard wooden settle.

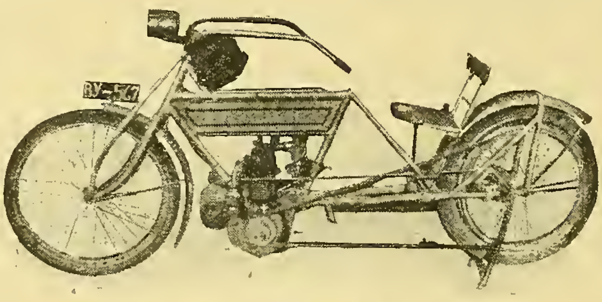


Fig. 3.—An early experiment in seat construction.

And is there any hardened rider who will seriously maintain that the hard-bottomed chair is not far and away superior to the present arrangement called a cycle saddle? Some manufacturers certainly have made efforts to free us from this bondage, but they have not met with unqualified success. The T.M.C. sidecar combination included this in its many other excellent features of originality, and incorporated a bucket seat that always looked very comfortable, though I cannot speak from experience as to its efficacy.

The XL'All Saddle.

As regards the efforts of the saddle makers themselves, the XL'All made a bold stroke in introducing their pan seat saddle. They soon modified their design, however, and secured more success with the modification than they did with the original, and so some people will certainly say that the average motor cyclist thus proved his satisfaction with the present form of saddle, and the absence of any desire on his part for an innovation to increase his already ample comfort. But not at all; the new saddle was an innovation, and, like all other novelties, cost more money than the commoner article. Which explains everything.

And, strange to say, the XL'All pan seat was not always an improvement as far as the rider's comfort was concerned. On one combination that I owned it was bliss, on another it was misery. And here the "size croakers" will have a chance to score, for everything in the case of this particular saddle depended on the size of the rider and the relative positions of footrests and saddle on the machine. On the first machine the footrests were higher than normal.

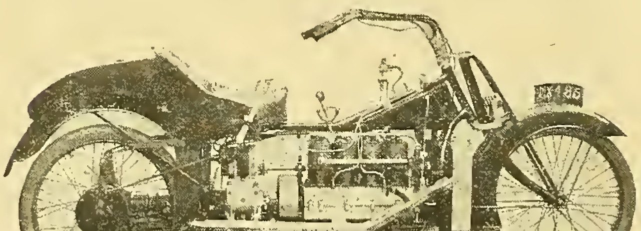


Fig. 1.—The T.M.C. or Ogden motor cycle. This premature machine contained, among its many excellent novel features, a seat on the basis advocated in the accompanying article.

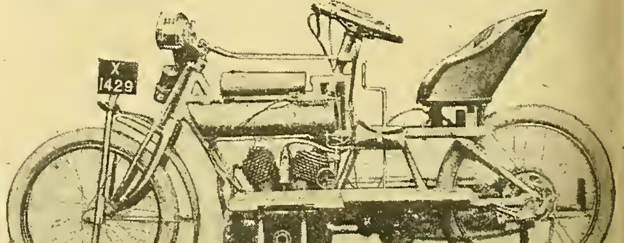


Fig. 2.—Another early example, incorporating also wheel steering. In many respects this machine is reminiscent of the old tricar, and, indeed, is possibly a converted example.

iding Position.—

n the other the footrests were relatively low, and so e rider's legs were normally more or less vertical. ush cycle practice demands a saddle that will enable the rider to get his legs as close together and as vertical as is reasonably possible, so that he may pedal the machine along—and in early motor cycles there was doubtless every justification for the continuation of this practice.

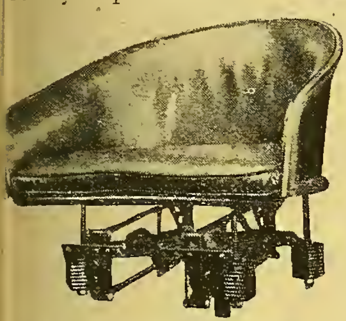


Fig. 4.—An example, on the market in 1905, of the bucket type of seat. This seat, having no peak, would probably afford little extra comfort unless it were tilted backwards at a considerable angle, and other considerations might prevent this from being done.

But the modern motor cycle does not need pedalling, and because of this there is no need for the machine to be designed so that the rider's legs will be aturally vertical and a push cycle type of saddle ecessitated in consequence. Therefore, if the achine be designed with this point kept in mind there no necessity for its saddle to be on the narrow ertical leg position push cycle lines. And the L'All saddle is not on these lines—it rather compels e rider to adopt a sitting posture. All which is as should be *if the motor cycle is correctly designed.*

The Importance of Frame Design.

My plea thus resolves itself into one for motor ycles that will provide a atural sitting position for the der, and, as a result, will in-olve the provision of a saddle at will be a saddle in nothing ut name. It will really be hat every saddle pretends to be—a seat. I would like to efer to the T.M.C. motor ycle again as an example that as actually materialised incor-orating these ideals, but to ake an exhaustive reference this machine takes up so uch paper—one never knows nder which of its many names is most likely to be recog-ised, and the full list is really oo formidable.

But most intelligent readers ill have gathered the gist of y argument, I think. We want a machine with some orm of bucket seat—preferably one that may be added or upholstered for post-war roads—and so rranged that the rider *is normally sitting and not half tanding on it.* As a result of the comparatively level floor of the seat the footboards must be higher than usual, or the rider's legs will dangle. This relative raising of the footboards may be accomplished in one of two ways—either by simply raising them or by lowering still further the saddle pin. Of course, the provision of a bucket seat will militate somewhat against the simplicity of the running mount, but who makes a running mount nowadays?

A compromise may be attained for small solo machines in the shape of an anatomical seat, but it should be seen that some provision is made for the outlet of water when the machine has to be left standing in the rain—*experto crede.* With the present-day lightweight, really efficient saddle arrangements are nothing more nor less than impossible. The main point that makes all the difference between an ordinary saddle and a special one is the presence or absence of support for the back as distinct from that portion of one's anatomy that takes the dead weight, and as this provision would militate somewhat against other and perhaps more vital considerations in the case of the small solo machine, it will have to be ruled out of court.

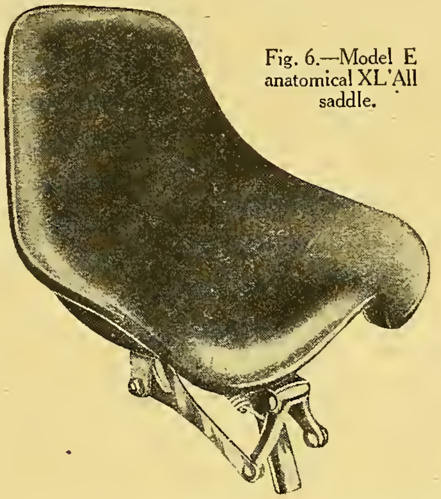


Fig. 6.—Model E anatomical XL'All saddle.

Nevertheless, an attempt in this direction has been made. The saddle, or seat, was simply a cushion—it could quite well be an air cushion—and there was a rest for the back of the quickly raisable or lowerable type. Something after this style would be the limit for riders who regard the running mount with affection, but otherwise some such arrangement as that shown in the sketch should be more satisfactory.

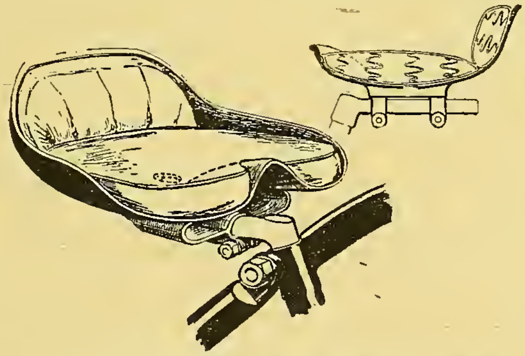
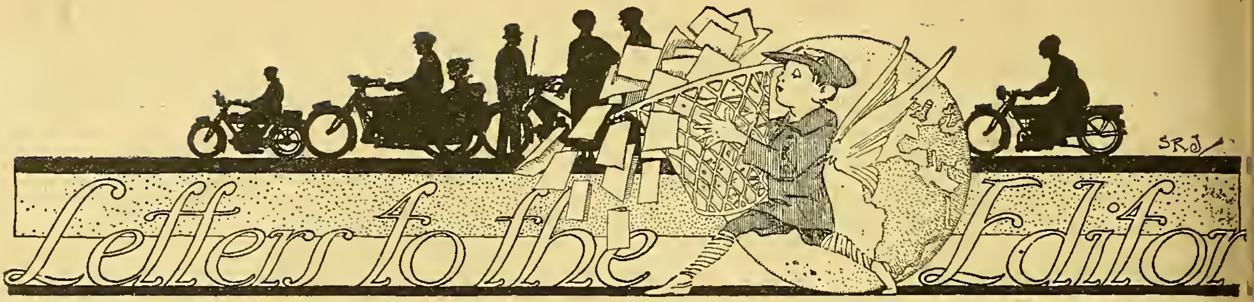


Fig. 5.—The saddle suggested by "Rama." Note the hole to allow the egress of water when the machine is left out in the rain (the upholstered cushions, being loose, would be removed, of course). This sketch simply illustrates the shape of the seat itself, and does not attempt to cover the question of the springing of the saddle as a whole.

The construction of the framework of this suggested saddle is much like that of the XL'All Model E—known as the "Sidecar Seat and Rest," although when I first thought of it I had never seen this model, all my experience having been with the smaller pan-seat type. The framework is one piece of pressed steel and is covered on the inside with leather. On top of this are placed two cushions that ensure some extra degree of comfort for the rider on a long run. Thus the rider can arrange them within limits to meet his own fancies. RAMA.



The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

THE HORIZONTAL COUPLE.

Sir,—Please let me hasten to dissuade "Bob-weight" from any suspicion that I have discovered a new theory of balancing. At the same time, I must admit that his criticism is in part justifiable.

The article in question was written to explain certain previous matter in a simple manner for the benefit of non-technical readers, and possibly errs in the elimination of too much detail.

Perhaps "Bob-weight" will raise no objection, therefore, if his remarks are gratefully accepted as an expansion of those details which were not sufficiently explained in the first instance. WHARFEDALE.

A BAFFLING EXPERIENCE.

Sir,—With reference to a letter in *The Motor Cycle* of April 18th by Mr. F. W. Chapman, it may interest this gentleman to know that I had a somewhat similar experience on my Triumph about a year ago.

The engine, which had been running well, suddenly started misfiring, and I, too, did the same as Mr. Chapman. The plug sparked quite well when taken out, but nothing happened when it was in position. Suddenly I saw the trouble. The high-tension wire was shorting with the carburetter controls, just underneath the tank. The two were only just touching, and when the plug was removed the wires were at the same time separated, and the spark was O.K.

Perhaps Mr. Chapman has the same trouble, and if not I hope I have given him a clue on which to work.

Canterbury. A.G.C.

Sir,—The misfiring (as reported in your issue for April 18th) which Mr. F. W. Chapman experienced was probably caused by the swelling of the fibre brush on the magneto contact breaker rocking arm. He had probably been driving through heavy rain, which caused the fibre brush to swell and stick intermittently with the platinum points apart. During the night the brush dried out, and consequently worked freely again.

THE LODGE SPARKING PLUG CO., LTD.

TALL STORIES.

Sir,—I have heard some pretty tall stories before now about motor cycling by aspiring young speed merchants, but this, the latest, I think, absolutely takes the bun.

The other day a fellow cadet tried to make me swallow the following yarn: "I own a $2\frac{1}{4}$ h.p. Diamond two-stroke, and recently rode from Essex to the North of Scotland in two days.

"The fuel used on this journey was acetylene gas supplied by an ordinary lamp generator, which had to be recharged every twenty miles or so.

"While travelling at speed the sparking plug blew out and hit the tank. Luckily this occurred just outside a garage, and so I went in and was supplied with a new cylinder, and was under way again in about half an hour."

On being asked about the arrangements made for supplying gas to the engine, he replied that a pipe was simply taken from the generator to a point in the induction pipe between the carburetter and cylinder, the control being by the ordinary carburetter throttle! CADET, R.N.

Dartmouth.

THE A.A. AND THE UNITED COUNCIL.

Sir,—The following reply has been sent by the Aut mobile Association to the proposals recently conveyed b the secretary of the United Council of Motor Users, Pr ducers, and Distributers, that the clause in the Council constitution, upon which the Association's refusal to joi the Council was chiefly based, be amended; and that conference be arranged to discuss amendments.

STENSON COOKE.

April 17th, 1918.

Dear Sir,—Your letter of the 15th March has no been considered by my committee, and I am directe to inform you that in their opinion there is at preser no reason for any conference on the lines suggested.

I am again to refer you to our letter of the 1s November last, expressing my committee's opinion tha questions on matters pertaining to the production, di tribution, and use of motor vehicles, which may b affected by legislative or other proposals, can best b dealt with at conferences of the bodies concerned, t be held from time to time as the occasion may aris

Yours faithfully,

STENSON COOKE, Secretary,

The Automobile Association and Motor Union.

Horace Wyatt, Esq.,
The United Council of Motor Users,
Producers, and Distributers,
39, St. James's Street, S.W.1.

TO MANUFACTURERS.

Sir,—As a constant reader of *The Motor Cycle* for man years, I should like to write you on two points connecte with the motor cycle industry that appear to me of re importance.

First, tanks. The old pattern narrow tank, to hold gallon or less of petrol, always gave trouble sooner or late but usually took two years or so to do it. The modern wid tank, holding over two gallons, takes about two months t start its first leak, and gives trouble at periodical interva ever after. Seeing that motor cycles are so largely used fo business purposes nowadays, this is a very serious matte One cannot help thinking that the mistake made by tan manufacturers is that they employ tinsmiths when the should employ boilermakers. For goodness' sake let us i future have a good honest row of rivets on our tanks, or l them be made of steel sheeting oxy-acetylene welded.

Secondly, carburetters. *(a)* When will manufacture realise that a really petrol tight cover to the float chamb is an absolute necessity if there is to be any real economy i petrol? *(b)* Some carburetter manufacturers do not yet see to have realised that, in the inverted needle type of flo chamber, it is absolutely essential that the action of the flo should be restricted to very narrow limits by a support und the float. No one would dream of allowing the ball of non-return valve in an oil pipe a run of half an inch or mo backwards and forwards, and yet I know of one carburette at any rate, sent out to this country (South Africa) with r tubular support under the float, with the result that the flo is bobbing up and down with half an inch or more of petr under it. It is easy to imagine the wild devil's dance do by the float on rough ground, or when travelling at spee This instrument is the multi-jet type and costs £4 out he as a special fitment. E. A. D. SOUTHBY.

Johannesburg.

A LUBRICATING TIP.

Sir,—Referring to the letter by "Dan" in 7th ult. issue. As he appears to have had some experience with castor oil, would he be good enough to state whether castor is better than engine oil as a lubricant, irrespective of cost, as his letter appears to give that impression, and also the effect on formation of carbon in comparison with engine oil?

WIMBLEDON.

A USEFUL TIP.

Sir,—I give the following tip, which you may think worth publication. When standing still on a solo machine, with the engine running free, if the engine is running very slowly and tends to stop, slightly tilt the machine between the legs, so that the float chamber is brought to a higher level in the jet. The result will be that the engine will accelerate slightly. This, of course, only applies to machines where the float chamber is to one side of the jet.

I find this tip very useful when stopping to light a pipe, when one's hands are not free to open the throttle slightly.

E.E.F. S. E. FOX.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—With reference to the letter of "Sufferer" (Farnborough), I would very much like to endorse his views, being one of the persons in the same position.

It does not seem at all fair that motor cyclists, who on joining up had to prove that they had had previous experience, should have to take a place lower than M.T. drivers. On the whole, a motor cyclist requires an equal, if not a greater, amount of practical and technical knowledge than a car driver.

I think you will be doing motor cyclists of the Royal Air Force a very great service if you take up this matter on their behalf.

UN AUTRE.

Wye, Kent.

Sir,—I have had two years with the balloons in France, and have noticed the lack of appreciation shown us, as also has nearly every other R.F.C. D.R. to whom I have spoken. I consider we have every right to be classed as "technical," and that a great injustice is being done to us. I feel sure that the influence of *The Motor Cycle* would greatly help to right this wrong. I hope to see many other letters on the subject appearing in following issues. Why, as "Old Reader" suggests, can we not be classified as D.R.'s? Surely we are as much entitled to the title as the R.E.

1st A.M.

Birmingham.

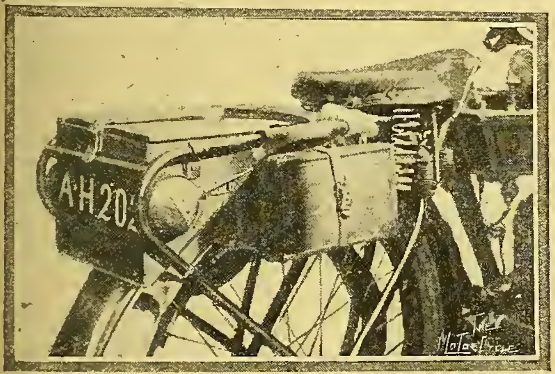
[We deal with this subject editorially.—Ed.]

AN IMPROVED TOOLBOX.

Sir,—I noticed in *The Motor Cycle* of March 21st an illustration of what I think was called an "improved toolbox," which was described as being "registered." It does not seem to me to differ essentially from one which I made myself two or three years ago, and have used ever since. I enclose photograph showing its arrangement.

AH 202.

Diss.



A toolbox constructed by the writer of the accompanying letter.

FRONT MUDGUARDS.

Sir,—Some time ago I noticed a description of front mudguards, giving the different styles used.

One was a description I took to refer to the P. and M., and was described as bad for clogging up with mud.

I had a P. and M. for three years and never had any trouble (mud or any other) with the machine, and would not have parted with it if it had had the power required, but I have done fifty miles in one day with four up.

I cannot speak too highly of this machine. Now I have a machine with the perfect (?) front mudguard, and it has caused me more trouble in three months, and is not right yet and never will be.

One mistake is, I think, that the guard is fastened on to the unsprung part of the fork. A second fault is that the spring-up front stand is the only fastener for the bottom part, and is quite inadequate to stand the vibration on a 6 h.p. Moreover, the Druid fork does not fit in with this sort of shield. And when it comes to dismantling, fancy twenty-six odd small bolts and nuts, and rusty at that.

Besides it is one of the dirtiest I have met; both legs mud to the knee, the inside (next cycle) mud from end to end, and the glass screen covered, and this at under 20 m.p.h.

Kirkwall. ORKNEY.

A GOOD AMERICAN.

Sir,—May I, as an interested reader, add my opinion to the controversy on English *v.* American machines, which I have followed?

My brother has an "over-engined crudity" combination, fitted with 760×90 mm. tyres, which I have driven many hundred miles, and found it the acme of comfort and easy handling, possessing also speed and reliability. As for reliability, this machine, after having covered 7,000 miles, carried my brother and me last August a tour of 970 miles, which was done in five days' actual riding.

Starting from North Notts, we rode into Exeter, and from there toured Devon, the outward journey being 225 miles and the return journey 249 miles.

On these two occasions we carried luggage, spares (not needed), three tins of petrol, one gallon of oil, with passenger—weight over 20 stone. This is a good test for the engine, which ran continuously, except for replenishing the tanks.

But the way the bicycle passed several English combinations, not to mention three solo machines of well-known makes in open contest, was sufficient proof of efficiency, and was not the least enjoyable part of the tour.

MILDRED SMITH.

PETROL FOR MUNITION WORKERS.

Sir,—Some few weeks since your contributor "Ixion" published a paragraph which aroused some indignation in France, and which, I think, calls for comment.

The paragraph in question was in connection with the new petrol restrictions, and he was attempting to make a case for the munition worker. His opinion was that the munition worker, before all others, should have petrol for purposes of recreation. Now why on earth should he? He has a safe job at home. He makes more money than he ever did in peace times. If he does work overtime he is generally paid well for doing it. He suffers no undue hardships and, when he feels tired, he goes on strike—while his countrymen are dying in different parts of the world.

Perhaps the most absurd contention made was that the man on active service at the Front was more healthy than the munition worker, had, in fact, a more healthy job. If that is the case then the man who has been on munitions for a couple of years must be in a fairly bad way. Take the infantry soldier. Supposing that he has not been killed by the "healthy" life he leads, does "Ixion" seriously think that it improves a man to live waist deep in mud and water? My own experience is chiefly with D.R.'s, and, without exaggeration, I can say that 80% of the D.R.'s who have done two years' riding in France suffer from rheumatism and, more or less, chest troubles, not to mention nerve troubles, etc. These things may not be serious now, but will undoubtedly be felt in years to come.

I think that most people will agree with me that if anyone should have petrol it should be the man home on leave.

France. D.R., R.E.

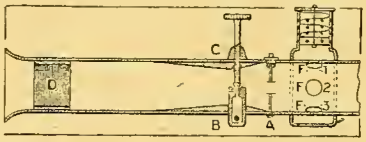
Sir,—Possibly the following may interest you. I am an enthusiastic motor cyclist, and an electrician in charge of the works plant of a Government controlled establishment here. Not being allowed to use my motor cycle to get home at the week-ends, I have to do the journey partly by train and partly by push cycle. The only train which suits me leaves here at two o'clock. On making application for my usual ticket on a recent Saturday, I was told that all tickets were sold for this train. Now the point is this: Ninety-nine per cent. of those passengers were on pleasure bent, their object being a league football match, while I and others, wishing to get to our respective homes, had to stand aside. This meant that I did not get home. Now, if the Government make it illegal for us to use our motor cycles to get home, why cannot they introduce some legislation on the railway whereby, in a case of this kind, ordinary passengers shall have preference of tickets and football supporters the available residue. If it is illegal to travel in the one case, it ought to be illegal in the other, as nowadays the trains are every bit as scarce as petrol.

Kilmarnock. DISGUSTED.

[It is often misleading to generalise without restraint from one's own experiences.—Ed.]

SIMPLE TYPE CARBURETTERS.

Sir,—Seeing that there had been some correspondence in your columns on the subject of carburetters, I thought that details of a home-made instrument might interest your readers.



The simply designed carburetter referred to in accompanying letter.

The carburetter in question was tried on a B.R.S. Norton with excellent results: it gave 118.5 m.p.g., 76 m.p.h., and terrific acceleration. As will be seen from the drawing, it consists of a straight metal tube fitted at A with an iris diaphragm operated by a Bowden wire. Just in front of this is situated the jet, the opening of which is controlled by a needle valve having a large knurled head, so that it can easily be altered from the saddle, there being a thread in the metal cap C. At D there is a piece of lamp wick glued inside the air inlet, which absorbs any blow-back, and so greatly improves the petrol consumption. The extra air inlet consists of a metal cylinder surrounding the inlet pipe, with which it communicates by means of holes F_1, F_2, F_3. Into this metal cylinder is inserted a barrel having holes in it, the opening of which is controlled by the usual type of throttle piston.

The carburetter was tried both with and without a float chamber, and no difference to the running could be noticed, except that the jet had to be kept further closed when no float chamber was used.

The carburetter was not originally intended to be particularly economical, but chiefly for obtaining speed; however, it was considerably less wasteful in fuel than that originally fitted. J.C.G.

Crowthorne.

CARBURETTER ADJUSTMENT.

Sir,—I have noticed recently that several correspondents have had trouble in setting Binks carburetters, and as I have used different types of these on several machines, perhaps my experiences may be of some use. So far I have never failed to get perfect results, and the only other carburetter I really care for is the Schebler, which also takes a lot of setting in the first place.

Though anyone can get very fair results from the three-jet Binks, I certainly recommend the average novice to stick to such straightforward instruments as are usually fitted as standard to new machines. To get really perfect results requires some experience, and no little patience.

To deal with the actual setting, I have always found singles to require larger jets than twins. A good combination to start with is as follows: Single, 500 c.c., pilot 00, middle 4, and main 8. Twins, 500-1,000 c.c., pilot 000, middle 3, and main 6.

Remove the carburetter from the stump, and, keeping the control wires in the position they normally occupy on the machine, mark the controls for fully open pilot and fully ope middle. It is no use trying to get these positions throug the air intake, as the choke tubes are not cylindrical.

Take the machine on the road, and, when the engine thoroughly warm, try running with the pilot jet fully ope First restrict the main air intake, and then try opening th extra air slightly. If no *maintained* increase in speed noticeable the jet is right. If the engine will take air, f a smaller jet and *vice-versa*.

Having got the pilot right, repeat the process on th middle jet. It is no use bothering with the middle jet unt the pilot is right, and no use bothering with the main unt the middle is right, as, when running on the middle je the pilot is also supplying petrol, and when the main open all three are working.

Having set the first two jets, lock the bottom air slid one-third open, and fit a main jet which gives a corre mixture at seven-eighths open throttle on the level, th extra air being closed.

The three correct jets are then in the carburetter, but may be found that the mixture is not right for all thrott positions. As turned out by the makers the mixture generally far too rich when the pilot is almost closed for tick over in free position, and rather weak when the middl jet is just opening.

To correct the first, file out the pilot jet choke tube o the air intake side towards the top of the carburetter. Th amount of gas passing to the engine is controlled by the are of the pilot choke open to the induction pipe, and the qualit of the mixture by the area of the pilot choke open to th air intake. Thus, filing as above gives a weaker mixtu when the pilot choke is almost closed, while not affecting th mixture when the pilot choke is fully open to the inductio pipe, the mixture then being governed by the area immed ately over the jet, which, of course, is not altered.

If the mixture is also found to be rich with the pilot abo half open, the filing should be extended sideways also.

To correct for weak mixture when the middle jet begin to open, fill up the already chamfered edge of the middl jet choke tube, and then file as required just as with th pilot jet. By proceeding on these lines it is possible to ge perfect acceleration on the two smaller jets.

To set the main jet the bottom air slide is used. A littl thought on the principles of the carburetter will show tha these air holes only affect the running when the main je just opens and immediately after. When running on eithe the pilot or middle jets, or with the throttle wide open, the have no effect at all.

Thus, if the mixture is found to be too strong when th main jet is first opened, as is probable, open the air slid further, until the mixture is perfect all the way up to seve eighths throttle. After that it should become weak.

Of course, there must be absolutely no air leaks anywher If the setting is correct with a warm engine it will give weak mixture when the engine is first started, so it is n advisable to slam the throttle wide with a stone cold engin Also a hill should not be climbed slowly with the thrott wide; about two-thirds to threequarters open is the righ slogging position.

For speed on the level, open to seven-eighths and no mor and if your machine slows a bit on a hill *close* the thrott instead of opening it. The engine will then pull with a Bink as with no other carburetter made. Then, if you come to bit of down grade, you can get a prodigious speed by openi up gradually until the throttle is wide.

To quote a few specific instances. Fitting a Binks to 3½ h.p. Sunbeam enormously improved the acceleration wit out affecting the maximum power, and gave positively u canny starting and slow running. Another Binks convert a 90 bore T.T. Zenith into a delightfully controllable machin with wonderful consumption, and no lack of power. Y another rendered the short but merry life of a certain raci flat twin much more comfortable for its owner. A fourt fitted to a Powerplus Indian, is filling me with fresh gratitud In fact, I have never known a properly set Binks do an thing but improve a machine out of all recognition. As rule, the better the engine the more noticeable the in provement.

In conclusion, the Binks is well worth while for anyo who will take some trouble with it. But if you do not kno or do not care, stick to two levers and one jet.

Ayr. BINKER.

THE LION MAGNETO.

The Latest Development of an Interesting Lightweight Magneto.

THE Lion magneto is not a new production. It is no new venture in an experimental stage, but is several years old—in fact, the first magneto was made previous to the war in 1914, and we described it, as fitted to all Radco machines, in our issue of February 17th, 1916.

The makers, the Britannic Electrical Co., Ltd., wish to correct the impression that it has just "arrived," and to give the motor cycling public to understand that it is a well-tried instrument and has behind it many years' experience.

We spent an interesting hour or so at its country home at Warstock, near Birmingham, recently. A small but well-equipped factory is as busy as most other similar houses. The whole instrument, except he Hoffmann ball bearings, is made here; magnets are cut, bent, ground, and magnetised. End and base plates are die ast in aluminium alloy; armature and contact breaker parts are cast in brass. Also the armature is wound, and a most interesting series of operations culminates in a six hours' running test.

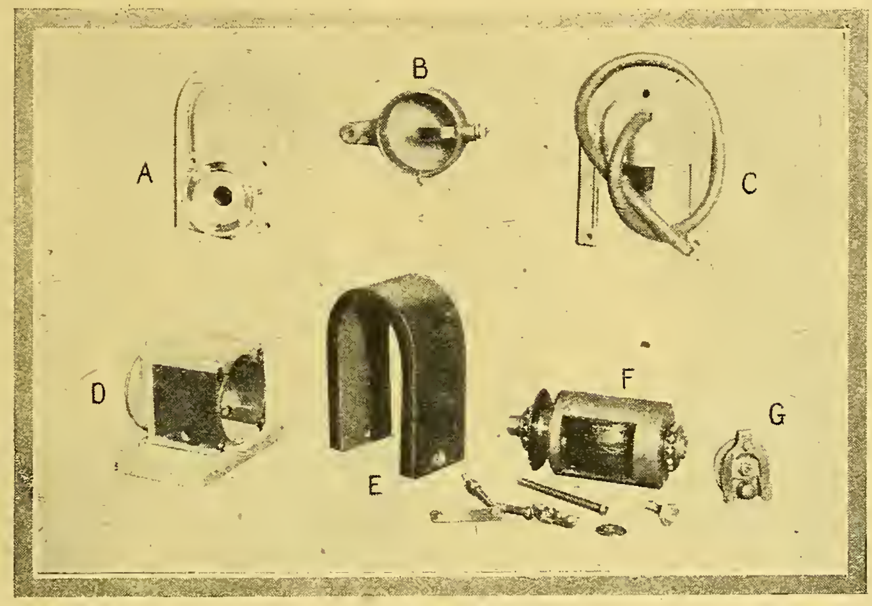
The general design is not unusual, and is substantially the same as that of the original model, the chief development being in the perfecting of methods of manufacture and test.

The contact breaker is somewhat novel. The operating cam is on the front face instead of on the interior face of the contact breaker body, thus giving the platinum points a horizontal breaking action.

Various stages in manufacture reveal a number of ingenious devices for the checking of faults in construction, notably in the armature winding processes. Three windings are separately tested on an instrument which indicates whether the correct amount of wire has been wound and whether any shorts are present. Another process extracts all moisture from the finished armature, and it is remarkable that so much moisture can lie hidden in an article composed of apparently dry metal, oil paper, and varnish. The testing of mica for the condensers and the method of check on the operator when assembling the condenser sheets are most interesting. In connection with the sheet mica test a Lion magneto has been in daily use for the last year or two without attention; this particular machine was the original model made by hand previous to 1914.

Although the Lion magneto is one of the smallest on the market, and intended only for lightweights, it has withstood much heavier tests; a Northern firm is using it on an outfit of approximately 5 h.p. The works manager, Mr. Alston, who has invented and made various instruments for checking and testing, tells us that he is about to run a magneto to destruction on a 10 h.p. two-cylinder light car.

A number of motor cycle firms have given the Lion exhaustive tests. As might be expected, the factory at present is handicapped by shortage of labour and material, but the output under normal conditions will be approximately 150 magnetos per week.



The Lion magneto dismantled.

A. End plate, carrying contact breaker bearing and actuating cam
B. Contact breaker strap and timing lever
C. End plate with high-tension cable attachment
D. Body and base plate
E. The magnet
F. Armature complete with slip ring and two ball bearings
G. Contact breaker

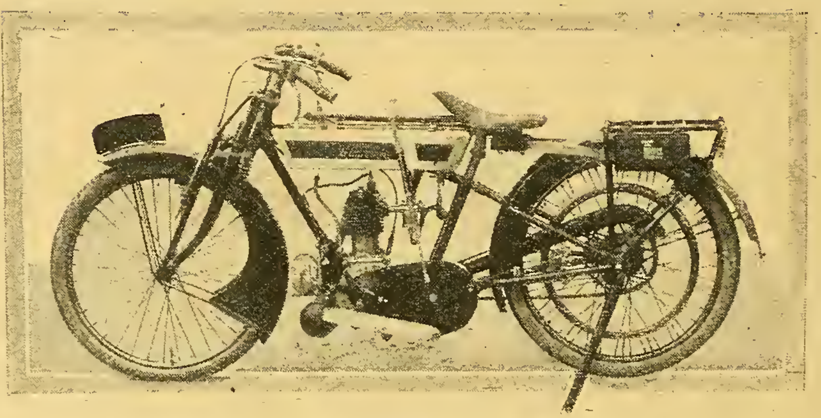
A MUCH REQUIRED BOOK ON TRANSMISSION GEARS.

JUDGING by the number of queries that we are continually receiving on questions connected with transmission, there is certainly plenty of scope for a reliable book on the subject, and Mr. Edward Butler, M.I.M.E., has recently attempted to satisfy this need in a book published by Charles Griffin and Co., Ltd., at 8s. 6d. net. The object of the book is to treat in a more exhaustive manner than has yet been attempted such matters as friction clutches, change-speed gears, and reversing methods. The author considers, and doubtless with ample reason, that there is much scope for further investigation into the whole subject, and this book should serve as a very useful groundwork for any designer who feels inclined to carry on researches into this all-important sphere. While the book is primarily written from the motor car point of view, and also deals with such distantly removed vehicles as tramcars, locomotives, and boats, the motor cyclist will find in it much to interest him. The book is plentifully illustrated.

The Edmund Spring Frame Motor Cycle.

2½ h.p. J.A.P. Engine, 70 mm. × 76 mm., 292 c.c.

IN *The Motor Cycle* of January 25th last year a reader, Mr. Percy Roberts, gave an interesting account of his experiences with an Edmund spring frame lightweight. One or two of his criticisms have been incorporated in the latest model Edmund. He suggested that the back mudguard should be better balanced, and that the back brake should be controlled from the footboard through a Bowden cable.


The 2½ h.p. J.A.P.-engined Edmund spring frame motor cycle.

The latest mo of this motor cy includes a brake fit up in the mam suggested by Roberts, redesig mudguards and spr footboards, while engine is the lat type J.A.P.

Messrs. Charles mund and Co., Lt Crane Bank, Chest whose spring fra has been so long the market, and been so well spol of by users, are a to supply a limi number of the latest models.

* * *

The National Motor Cyclists' Fuel Union.

The Point of View of the Union put forward by the Chairman.

MR. A. W. TORKINGTON, replying to our remarks regarding the meeting of the N.M.C.F.U. recently held in Coventry, writes:

"I have read with much interest your remarks on the N.M.C.F.U. meeting at Coventry. It was a crowded meeting of tired weary men, and it is not surprising that your representative, whom we were very pleased to see, has got a somewhat erroneous impression of the Union and its objects from remarks made by some individual members labouring under a sense of injustice.

The Position in Warwickshire

"I have laid it down very clearly at every general meeting that there is no petrol for recreative purposes—that is, joy-riding pure and simple—however much it may be wanted, and that decision, I am proud to say, has been loyally accepted by every meeting of members. We are indebted to Mr. Shrapnell-Smith for his visits to three meetings, in which he explained clearly and impressively the urgent need for economy, not only in petrol, but in every class of oil. The engineer in particular is appealed to, because he is always using oil in his work, and, consequently, could help much in the saving.

"I am bound to say that there is an unpleasant spirit abroad in Coventry. Who is responsible for it is not my business to enquire, but both the housing and food arrangements in Coventry are, apparently, worse than anywhere else. Thousands of workers cannot live in Coventry at all, and have to travel or walk a distance after standing twelve or more hours on their feet. They ask for petrol to enable them to reach their homes at night and come down to the works in the morning. This is the extent of the recreation, which, I presume, your representative looks upon as selfish and as trenching upon the needs of the country and the rights of other people. If that is so, then I have nothing more to say.

"During the time I was in Coventry I made enquiries as to the railway accommodation, and personally witnessed the ancient rolling stock which was trundled up and filled with munition workers, twenty in a carriage, on their way home to Warwick, Leamington, Rugby, Nuneaton, and other places, to which they must travel in order to sleep. Immediately afterwards I saw a director arrive by train and drive away in an elegantly appointed limousine. I do not begrudge this director his car, but if directors and employers in Coventry can ride home in motor cars, working men have the right to use their machines for the same purpose. [We agree—if the director was using his car *to go home*.—ED.]

"I am quite willing to show you privately full particulars of every claim which has been granted by the Controller, and I am certain that you would not only endorse every one, but agree with me that it is difficult to account for their not having been granted before. Upwards of four thousand munition workers' motor cycle licences have been renewed this year by the Petrol Controller without the intervention of the N.M.C.F.U. I think your representative did not quite grasp that.

A Doubtful Point.

"The quotation in italics with reference to bread contains the very words used by Mr. Shrapnell-Smith when appealing to the men to save all the oil possible. This article gives the impression that no munition worker is entitled to petrol at all under any circumstances. If this is what is meant it would be better to say so.

"As regards the men living two miles from the works, there has to be a minimum distance, and that minimum distance, to my mind, is two miles. A man who has to be on his feet twelve hours, in some cases fourteen hours, should not be called upon to walk four miles in addition.

"Another point on which your rep sentative has gone wrong is that effc are being made to interest branches the A.S.E. I never said anything of sort. I mentioned that in the tr I accidentally met a member the Executive of the A.S.E., and shown him the work which was be done, and he expressed his appreciati and said he would inform his branc so that men who were put to cert hardships might put their cases forwa

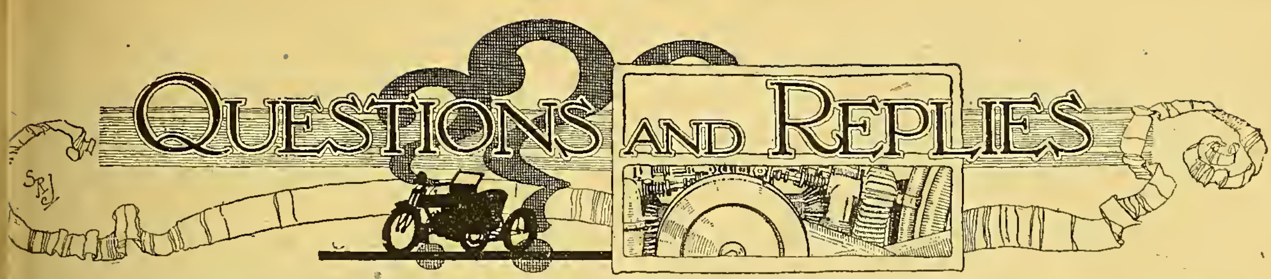
Glaring Inconsistencies.

"The men look upon going backw and forward to their homes as hea giving, and, in a way, recreative. you deny them this respite? You m tion inconsistencies. I will give some you do not mention. Six thous taxicabs are parading the streets London, many taking people to theat restaurants, home, etc., and this in a c where the means of communication unrivalled. Is that consistent with shortage of petrol? At Brighton, Ea bourne, Bournemouth, and other seas towns one sees large limousines for hi These cars are entitled to thirty gall of petrol per month, they are do nothing to help the war, nothing conserve the nation's stock of fuel, squandering it on purely pleasure a recreative joy-riding.

"The worst instance of criminal wa of petrol I have ever heard of was broug to the notice of the meeting on that v night. Hundreds of gallons of pet thrown away down an open drain, a this in Coventry. Small wonder the m are disgusted.

"Our efforts to impress on the men necessity of rigid economy are in the f of such facts rendered ridiculous."

[It was, we fear, perfectly true that mu petrol was being wasted in some of ways mentioned, and this natura caused the greatest indignation amo those who needed petrol for legitim purposes and could not get it.—ED.



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Making a New Gudgeon Pin.

As I am having a new gudgeon pin made for my motor cycle, I am writing to ask you the following questions: (1.) Is cast steel a suitable material? (2.) If so, s it better hardened or left unardened? (3.) Do you think that ild steel, case-hardened, would be ore suitable? (4.) If cast steel is sed, is it liable to fracture under ormal running conditions? The pin s hollow, and is for a Triumph piston, nd the other day, in fitting a new pin f hardened cast steel, it broke in two ieces, and that is why I am anxious o know whether hardened cast steel s suitable or not before making anther one.—W.M.A.

(2, and 3.) It is best to make the lgeon pin of cast steel, which you y use either unhardened or very htly hardened. We think this would more suitable than mild steel. (4.) ; cast steel is not likely to fracture. e cause of breakage was probably due overhardening. It should not be ted to more than a dark straw colour en hardening.

Storing a Machine.

I am storing my sidecar combination. I have taken off the tyres, and, as I have no French chalk in which to place the inner tubes, have put them in ordinary hiting. (1.) Now, will this do s well as French chalk, as I do ot want the tubes to get perished? 2.) Is it also advisable to paint the yres with whiting before hanging hem up? (3.) Should I disconnect he wires from the magneto? If I do ot, is there any fear of the magnets ecoming demagnetised? (4.) Can a win engine be left with all four alves closed?—C.H.

(and 2.) Yes, your method of storing inner tubes should be quite satistory. The best plan is to keep the es in a dark, but slightly damp, ce, where they will keep good for a g time without deteriorating. It is worth while painting them. (3.) No, re is no necessity to do this. There not much chance of the magnets oming demagnetised. (4.) If you look fig. 6 on page 46 of the current tion of "Motor Cycles and How to nage Them," you will see a diagramtic view of a V type engine in which valves are closed, the compression oke just beginning in one case, and firing stroke having been just comted in the other.

Needle Valve Leakage.

The carburetter of my 1916 7-9 h.p. Indian leaks badly when the engine is running. I have lowered the petrol level, fitted a new needle and ground it in, and have assured myself that all unions, including the jets, are tight. I cannot locate the leak, but I suspect the pilot jet. Could you kindly oblige me with advice on the matter?—P.W.S.

Probably in lowering the level you have bent the arms a trifle too much, with the result that the float is not central and fouls the choke tube. Carefully verify this point. The correct level is $\frac{1}{16}$in. from the top of the jet. Your needle valve should not have been ground in, as it is made of brass and will not stand grinding in with emery. If it leaks at this point it is only necessary to tap it in at the top and rotate it in its seating. The pilot jet cannot leak.

The Importance of ORDERING "The Motor Cycle."

In response to previous requests the majority of the readers of "The Motor Cycle" no doubt have definitely ordered their weekly copies and now obtain them regularly from their own newsagents.

There are some, however, who still purchase copies haphazard from any newsagents' shop or bookstall that happens to be most convenient at the moment.

This latter method leads to waste, for several newsagents are then catering for the one purchaser, and there is the risk of copies remaining unsold.

The shortage of paper is now so serious that all waste must be avoided in the national interest to economise shipping space.

EVERY READER of "The Motor Cycle" who does not subscribe direct and has not yet placed a standing order with a newsagent is requested therefore to give an order at once and regularly obtain his copies in future from one newsagent.

An Old Type of Machine.

I purchased just recently a 6 h.p. twin-cylinder Vindec Special, and have great difficulty in starting. I have tried the controls in all positions, and even tried heating round about the jet. If I advance the spark I sometimes get popping in the silencer and sometimes a sort of back kick, but the engine does not fire properly. The ignition timing seems correct, and the valves and compression are in perfect order. Once the machine is started it runs perfectly, and answers quite all right. Can you give me the name and address of the makers?—A.L.

The cause of your trouble may be due to the engine being one of the older models with automatic valves. Petrol should be injected into each cylinder before attempting to start. Difficult starting is frequently due to air leaks at the carburetter and induction pipe unions. Perhaps you are attempting to advance the spark too far when attempting to start. The makers are no longer in business.

Bomb Dropping.

What is the actual course of a bomb when released from an aeroplane travelling at a speed of about 60 m.p.h.? I contend that the bomb when released will drop with a backward motion, caused by the pressure of air when released. A friend contends that a bomb when released is carried forward for some distance by its momentum, and then falls directly to the earth. An airman has therefore to release the bomb before reaching his objective.—A.H.

The bomb travels forward as the result of the kinetic energy obtained from the forward motion of the aeroplane. The actual amount of this forward motion would involve complicated calculations, which, to be accurate, would have to take account of the speed of the aeroplane, the weight of the bomb, and the varying density of the air. The actual path traced by the bomb would be part of a parabola, and would therefore never be actually vertical. Your idea that it would fall with a backward motion is quite without foundation. The motion might appear backwards from the aeroplane, but this is simply a case of relative motion, and might almost be regarded as an optical illusion. Consequently, a bomber should drop his bomb before reaching his target, and not when immediately above it.

Play in Twist-grip Control.

I possess a 1914 Indian, and I wish to take up the slack inside the twist-grip. Would you be kind enough to tell me how to get the twist-grip apart from the handle-bar? I have looked all round, but cannot see how the grips are attached to the bars. I might add the grips are of the long rubber variety.—H.G.H.

Evidently your handle-bars are of the touring variety. If this is the case you can push the rubber handle grip forward until a joint appears through the handle-bar. Remove the rivet from this joint and then pull the handle-bar grip backwards, when it may be detached. To take up the slack you should rivet up the joints in the flexible cable of the control.

Building a Cycle Car.

I am building a cycle car, and am faced with a difficulty which I should be extremely obliged if you could solve. I had intended to braze the rear hub spindles directly into the rear axle, the front and rear axles being on the same level, but owing to a cone forming part of the spindle, which would be annealed and spoilt in brazing, I must change my plan. (1.) Can you suggest any other method of fixing the rear hubs? (2.) Will it matter if, by the use of special lugs, I make the rear hubs a few inches higher or lower than the front hubs? Is this ever done in car construction, and if not, why not?—T.E.N.V.

(1.) The usual method in your case is to turn down the spindle, make fresh cones, and sweat them on after brazing the stub axles into the tube. (2.) It will not matter if the rear hubs are a few inches higher or lower than the front hubs. This is not done, however, because, unless the job is a makeshift one, there is no reason for so doing. The single modern exception is to be found in heavy commercial lorries.

Fitting a Front Drive Speedometer.

I notice in a recent issue of *The Motor Cycle*, page 279, you show a Harley-Davidson with leg shields, and, what is more interesting to me, there is a front drive speedometer fitted. How has the owner been able to fix it? I may say that my attempt to fit one has beaten me. I have tried all ways, only to find, after about 1,000 miles, the cable smashes off short, close to the lower attachment. The local H.-D. agents told me they had come to the same conclusion—*i.e.*, that it was almost impossible to get the cable to stand any length of time. I have noticed that there is quite an oscillating movement on the bracket that carries the small gear wheel, and this is due to its being fixed to the hub spindle and the lower girder.—E.W.

While we agree that speedometer drives are not all that can be desired, with a little attention it is quite possible to make the cable stand up for a considerable time. You may be interested to hear that we know of a rider who has been using a front-drive Smith speedometer on his Harley-Davidson, the cable of which has stood up for about 6,000 miles. The following hint may be of use to you: Wind both ends of the cable carefully for a length of about 3in. with insulating tape, so as to prevent it from breaking away at the ends. Also have the speedometer clip sufficiently slack on the handle-bar so that a very bad bump will allow it to give slightly without throwing a strain on the cable. The Harley-Davidson Motor Co. inform us that they have about one hundred front-driven speedometers fitted to machines which they have sold during the past twelve months, and the percentage of complaints has been very small.

Licences.

I have bought from a private owner a second-hand lightweight to supplement my heavier sidecar combination. Kindly enlighten me as to the following two questions: (1.) Can the previous owner transfer his Inland Revenue licence with his machine? (2.) Will one driving licence cover the two machines?—L.J.

(1.) No, the local taxation licence is not transferable, and applies to one particular man, enabling him to keep and use a machine. You would therefore have to take out a fresh one. (2.) Yes.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD

A Variable Pulley in conjunction with a Three-speed Gear.

(1.) What would be the benefit of fitting a Philipson pulley to a 1913 Armstrong three-speed hub, as I may want to use a sidecar later, the local roads being good? Some time ago you advised a correspondent to fit one. (2.) Would an engine-shaft two-speed gear be any advantage? If so, in what way? I want to keep the long belt drive, as I much prefer it to the countershaft chain and belt. (3.) Could I fix a handle-bar control to the clutch bracket to operate by hand, or would a Bowden control be better and easy to fit? If so, where would it be procurable, and what would it cost?—T.U.B.

(1.) It would mean that, instead of having three speeds only, you would obtain an infinitely variable ratio between two points on any speed which was in engagement in the Armstrong, which we think would be a distinct advantage. (2.) No, the extra friction of the engine-shaft gear nullifies its service. (3.) In peace time it would be easy to get a Bowden control to actuate the clutch, but at the present time we fear this would be exceedingly difficult. We regret we cannot tell you the cost.

Licences.

I have a 6 h.p. Royal Enf
motor cycle with sidecarr
which I use in connection w
farm work, *e.g.*, retailing m
eggs, meal, potatoes, etc. A
is employed strictly as above, I s
pose no licence would be requi
However, owning a hiring car,
having occasion frequently to run w
a single passenger to the nea
station (four miles distant), I deci
in 1917 to take out a hackney lice
for my Enfield (which is easily
vertible into a passenger combinati
thus effecting a saving in both expe
and petrol. Now, what I want
know is, have I been committing
infringement of the law in using
Enfield in this dual capacity: (1)
a commercial vehicle, free of licen
(2) as a hackney carriage *(a)* for c
mercial purposes, free of duty, *(b)*
hiring, hackney licence being pa
Must my Enfield be considered
private carriage, and a full-duty lice
taken out?—A.L.

You may not use your machine in
dual capacity. You must use it as
sidecarrier, in which case it must
constructed and adapted solely for
transport of goods and merchandise, a
the sidecarrier must be attached p
manently—that is to say, a steel
must be driven through one of the n
and bolts fastening the sidecarrier chas
on to the motor bicycle. Using it in t
manner, you will be able to get y
petrol free of duty, and you will
exempt from the local taxation licen
If you use the machine in a dual capaci
then you will have to take out a full-du
licence, and if you have used the mach
in the past with a free-of-duty pet
licence you will be expected to repay
full amount of the tax on the pet
which has been allotted to you, and y
have also rendered yourself liable
grave penalties.

EXPERIENCES WANTED.

"G.B.A." (Suffolk).—6 h.p. wat
cooled Humber. Reliability, speed, c
sumption, and tyre wear.

If L. Butler, R.E., France, will kin
send us the address of his unit we sh
be pleased to reply to his communicati

RECOMMENDED ROUTES.

Staines to Hereford.—K.P.

Staines, Ascot, Wokingham, Readi
Streatley, Wantage, Faringdon, Fa
ford, Cirencester, Birdlip (down da
gerous hill), Gloucester, Ross, Hereford

Reading to Devonport.—G.N.

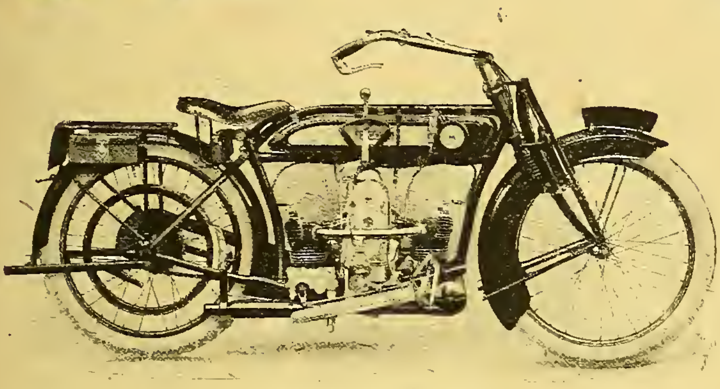
Reading, Theale, Newbury, Hung
ford, Devizes, Trowbridge, Frome, She
ton Mallet, Glastonbury, Taunto
Wellington, Tiverton, Crediton, Bo
Okehampton, Tavistock, Devonport.

Bewdley to Brighton.—J.H.

Bewdley, Kidderminster, Bromsgro
Alcester, Stratford-on-Avon, Shipston-
Stour, Enstone, Woodstock, Oxfo
Dorchester, Henley, Maidenhead, Wi
sor, Staines, Chertsey, Guildford, Ho
ham, Henfield, Brighton.

Humber

For the present our energies are fully occupied with War Work, but as soon as the output of Humber Motor Cycles is resumed orders will be executed in rotation.



3½ H.P. TWIN HUMBER.

"We have just taken down one of your motor cycles," writes an agent in Port Elizabeth, "after doing 9,000 miles, and, except for a slight deposit of carbon, she was in perfect condition, and none of her bearings need attention."

HUMBER LIMITED,
COVENTRY.

Useful alike to the Service rider and the private owner

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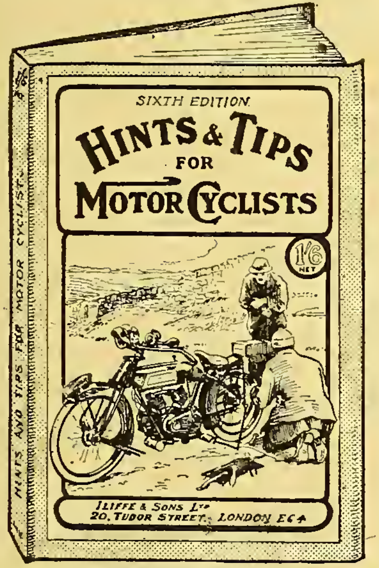
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1/6 NET
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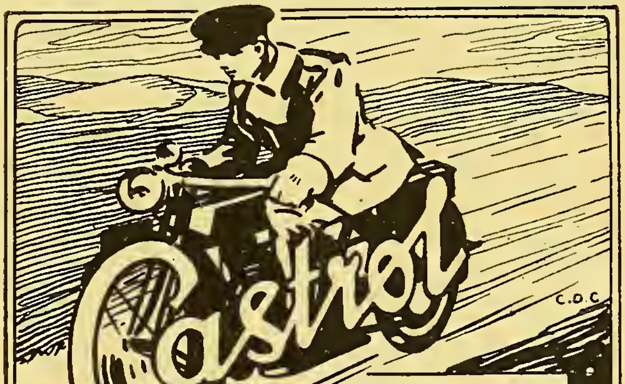

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MISCELLANEOUS ADVERTISEMENTS.

PRICES.

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All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

1916 A.J.S., 2¾h.p., 3 speeds, lamps, horn, numbers, etc.; £46.—Cross, Jeweller, Rotherham. [X3830

A.J.S., 1917, 6h.p. 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

A.J.S., 2¾h.p., 2 speeds, clutch, kick starter, new tyres, accessories, excellent condition, mechanically sound; £38.—Pearn, Kelsie, Birchfields Rd. S., Manchester. [X3811

A.J.S. 1916 Combination, 6h.p., splendid outfit, all accessories, spare wheel, hood, screen, etc., £97/10; 2¾h.p., 2-speed, £34; E.P. or exchange.—Service Co., 292, High Holborn, London. [X3885

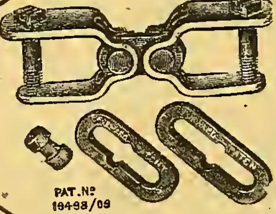
A.J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; £91/6; trade supplied; no permits required.—P. J. Evans, sole agent for Birmingham and district, 87-91, John Bright St., Birmingham. [4307

A.J.S., 6h.p., and sidecar, with wind screen, lamp, and horn; this is one of the latest 1915 models turned out, as it left the works in October, 1915. The outfit has been thoroughly overhauled and revarnished, and is practically equal to new in every possible respect; price only 70 gns.—Julian, 84, Broad St., Reading. Biggest light car and motor cycle dealer in the South. 'Phone: 1024. Closed Wednesdays 1 o'clock. [0735

A.J.S Spares: prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [9688

FORWARD

1/6

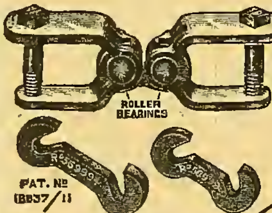


As you'd never question the three sides of a triangle so, when once you know the

FORWARD FASTENERS

you'll never doubt the triple merits of their Service—Strength Long Wear, and General Efficiency. Try them and see.

Forward Motor Co.
Forward Works,
Summer Row
B'ham.



1/-

Adjustable 1/3

KING HOOK

1266

BIG IMPROVEMENT AT SMALL COST

In any Motor Cycle or Car, of any make or any age, obtained in 10 minutes by fitting

THE EUK EASY STARTER

The perfect cure for stubborn starting.
Over 33,000 in use.

FOR CAR 36/-.
Motor Cycle 21/-.

Details free from—
ALEXANDER & CO., Dept. B, 115, Lothian Road, EDINBURGH; 274, Gt. Western Road, GLASGOW.

MOTOR CYCLES FOR SALE.

Alldays.

ALLON, 2¾h.p., single, £38, new; 2-speed, £45, 2-speed and hand clutch, £48, new; 2-s £28/10; E.P., or exchange.—Service Co., 292, Holborn, London. [X

ALLDAYS Matchless, 3½h.p., 2-speed, wicker pedo sidecar, lamps, and accessories, tyres an in splendid condition; great bargain, £29.—Thom 47, Dyke Rd., Brighton. [X

ALLON, 2¾h.p., 1915, 2-stroke, single speed, a cessories, new Millers lamps, engine overh fitted with new bearings, excellent order; £21.— Pendlehurst, Ulverston, Lancs. [X

FOR Sale, the property of an officer leaving for Fr Alldays Allon 2-stroke 1915 motor cycle, com and in perfect condition, with new tyres.—Seen Wall, Cycle and Motor Agent, 10, Aldenham Rd., O

Ariel.

CROW Bros., Guildford.—Ariel, latest 3½h.p., 3- countershaft models in stock.

Auto-Wheels.

WALL Auto-Wheel, Model de Luxe, 1916, used, perfect condition; £12/10.—Rev. Rob Woodland Leigh, Torquay.

Bat.

BAT, 1915-1916 model, 6h.p. twin, 2-speed co shaft gear, round tank; £45; guaranteed.— chope's, 9, Shoe Lane, London.

Bradbury.

1913 T.T. Bradbury, Grado gear, good cond £18; exchange later model, cash differe Hedges, 3, Chichester Place, Paddington.

BRADBURY, 1912-13, 3½h.p., 3 speeds, with sidecar, £32/10; 1913 3½h.p., 3-speed £29/10.—Motor Exchange, Horton St., Halifax.

BRADBURY (late type), with new coachbuilt si 6h.p. twin, mag., 3-speed, countershaft, kick, drive; only 55 gns.; easy terms.—Wandsworth Exchange, Elmer St., Wandsworth (Town Station).

Brown

BROWN, 3½h.p., mechanical valves, no accum splendid condition; £5/15. Soper, High St., end.

B.S.A.

B.S.A., I.O.M. model, 3-speed; £37/10; E.P. change.—Service Co., 292, High Holborn, L [

4¼h.p. B.S.A. Combination, 3-speed gear, counte all-chain drive; £35, bargain; guaranteed.— chope's, 9, Shoe Lane, London, E.C.

B.S.A., all-chain model, in thorough running £40; new 650×65 Dunlop cover, 25/-; appro deposit.—H., 5, Cadwell Rd., Paignton.

1915 B.S.A. Combination, Model K., large P. a head lamp, sidecar and rear lamps, motor in perfect order, and a bargain, £55.—Walbro Co., Saffron Walden. [

B.S.A., 1917, 4¼h.p., 3-speed countershaft, Fulford sidecar, elaborately equipped, whol fit unscratched, only done 500 miles; £90.—Meb Mebes, 154-6, Gt. Portland St., W.1.

3½h.p. B.S.A., 1913 chain drive, 2-speed hub starter, engine just rebuilt by B.S.A. at c £11, lamps, horn, tools, spares, and cane sidecar —Lt. Reed, R.N.V.R., Park Hotel, Preston. [

1916 B.S.A. Combination, Model K., with Canoelet sidecar, storm apron, P. and H. lamp, sidecar, and rear lamps, tyres good, enam plating not scratched; £60.—Walbro Cycle Co., Walden. [

Calthorpe.

1916 Calthorpe, 2-stroke, 2-speed, lamps and splendid condition; only £28.—Parker an St. Ives, Hunts.

CALTHORPE-J.A.P., 2¾h.p., new models, £ new single-speed model, £32; also a secon Calthorpe, £15.—Wauchope's, 9, Shoe Lane, Lon

CALTHORPE Motor Cycles.—All models in st immediate delivery; trade supplied; no required.—P. J. Evans, 91, John Bright St., Bi ham.

1915 2¾h.p. Calthorpe-Jap, Enfield 2-speed gea thoroughly overhauled, in perfect running £18, or near offer.—Lt. Coles, 1, Pulteney Bu Weymouth.

CALTHORPE, 2-speed countershaft, 2-stroke, 1 splendid condition, not done 500 miles, tyr fect; £30, or nearest offer; can be viewed in Lo Box L6,039, c/o *The Motor Cycle.*

LATE 1916 Calthorpe-Jap, 2¾h.p., 2-speed gear, only run 150 miles; £30; indistingu from new; or exchange for household furniture.— Percy St., Thornley, R.S.O., Durham. [

THE MOTOR CYCLE
ESTABLISHED IN 1903
A posse ad esse
AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

Advertising and Publishing Offices:
20, Tudor Street, London, E.C.4.
Telegrams: "Cyclist, Fleet, London."
Telephone: 2848 City (five lines).

Editorial Offices:
Hertford Street, Coventry.
Telegrams: "Motorcycle, Coventry."
Telephone: 10 Coventry (five lines).

Northern Offices:
199, Deansgate, Manchester.
Telegrams: "Iliffe, Manchester."
Telephone: 620 City.

Subscription Rates: Home, 15s. 2d.; all countries abroad, 19s. 6d. per annum.
The Foreign rates quoted above apply also to men in the Services abroad.
COLONIAL AND FOREIGN AGENTS:
UNITED STATES—The International News Agency, New York. CANADA—Toronto News Co., Ltd., Toronto; Montreal News Co., Ltd., Montreal; Winnipeg News Co., Winnipeg; British Columbia News Co., Vancouver; Gordon & Gotch, Ltd., 132, Bay Street, Toronto.
AUSTRALIA—Gordon & Gotch, Ltd., Melbourne (Victoria), Sydney (N.S.W.), Brisbane (Queensland), Adelaide (S.A.), Perth (W.A.), and Launceston (Tasmania).
NEW ZEALAND—Gordon & Gotch, Ltd., Wellington, Auckland, Christchurch, and Dunedin. INDIA—A. H. Wheeler & Co., Bombay, Allahabad, and Calcutta.
SOUTH AFRICA—Central News Agency, Ltd. PARIS—Smith's English Library, 248 Rue Rivoli.

The Gas Traction Committee.

IN the report of the Gas Traction Committee recently held under the chairmanship of Sir Boverton Redwood, some interesting recommendations were made with regard to the use of coal gas in motor vehicles. Of most of these our readers are already aware. We note that the Committee recommends the official reckoning of 250 cubic feet of gas of a gross calorific value of 490-500 British thermal units per cubic foot as the equivalent of one gallon of motor spirit, and on this consumption ratio gas at 4s. per thousand cubic feet is equivalent to motor spirit at 1s. per gallon.

They also recommend that the gas inlet to the container of any vehicle in general use should be of iron gas-pipe, 2½in. bore, screwed externally with British standard pipe-thread to take a union of that size of pipe. They further recommend that a charge of 2d. per 100 cubic feet should be levied for filling, with a minimum charge of 6d. when the filling is done at a filling station or depot.

When a flexible container is carried on a trailer the fabric of the container should be protected by a separate covering of canvas or other light material, stretched over hoops or other sufficient support of wood or metal.

There should be a positive cut-off valve and automatic non-return valve between the flexible container and the point of gas delivery to the carburetter intake or the induction pipe.

One of the most important observations of the Committee is the following: It is undesirable that semi-rigid containers of rubber and canvas or other proofed material should at present be allowed to be charged with gas to a pressure greater than 90 lb. to the square inch, or should be of a larger internal diameter than 4in., and even with these limitations containers of this class are, in the opinion of the Committee, unsafe if not properly armoured with galvanised steel wire of 0.012in. diameter (No. 30 B.W.G.) The Committee also recommends that experiments should be permitted and encouraged by the authorities for the construction or use of semi-rigid containers of woven wire up to a pressure of 300 lb. to the square inch, and it is desirable to encourage forthwith a limited number of experiments of a commercial scale with compressed gas in rigid metal cylinders, plain or wire wound, of pressure up to at least 1,800 lb. (120 atmospheres) per square inch.

The Fuel Question Again.

ON another page in this issue we mention some of the main points of the address given to the British Commercial Gas Association by Sir Robert Hadfield, F.R.S. There is, of course, much in this report that does not concern the motorist's aspect, but there is no harm in emphasising the possible close connection between the coal gas and the motor fuel industries. As we point out in our extracts, benzole depends for its existence in this country almost entirely on the coal gas and allied industries. But in Germany this dependence is very much diminished by the existence of a well-organised and prosperous dye industry. Another point that Sir Robert made was that Germany had enormously increased her trade in this respect, so that whereas once upon a time, and that only some twenty years ago, she was dependent upon us for most of her raw materials, she was now practically self-supporting in this respect, and we were largely dependent upon her for the finished articles for which those raw materials had been required—the dye trade materials.

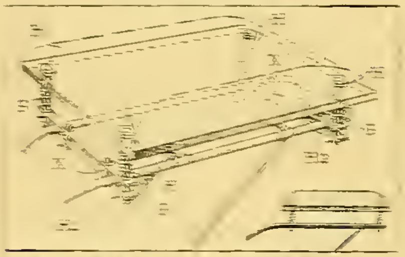
We have in our pages already emphasised the enormous value the dye trade has been to Germany as a source of motor fuel and explosives in the present war, and we have no hesitation in commending to our rulers this address of Sir Robert Hadfield as expressing in a nutshell a very important situation that we must watch with every care both at once and after the war.

IDEAS: Useful and Ingenious.

A SIMPLY DESIGNED SPRING PILLION SEAT.

THE pillion seat described was fitted to my motor cycle last year. It is a very simple yet effective contrivance, the parts that are necessary being four bars of steel, say, [illegible]in. × [illegible]in., and about 3in. longer than the extreme width of the carrier; also four long bolts or studs about [illegible]in. diameter screwed at both ends and about 5in. long.

Procure four ordinary cycle saddle springs and a thick board about [illegible]in. thick, and about as wide as the length of the above-mentioned steel bars. The length will be according to requirement.



A useful design for a spring pillion seat.

Drill [illegible]in. holes in the bar as near the ends as possible; also holes along the bar so that they just clear the inside of the carrier, as at X X. Next drill the board and push through the studs, and put spring and washers on H H. Bolt the bars to the carrier and fix nuts E, E. Note the bolts G, G move freely with the spring play through the holes in the ends of the bars; the bolts X, X, hold the bars firmly to the carrier.

The only thing necessary now is to pad and upholster the board.—H. [illegible].

ALTERATIONS TO A P. & M. KICK-STARTER.

THE kick-starter on a P. and M. cannot be called one of its strong points—at any rate, I have at times had trouble with the machine in this respect.

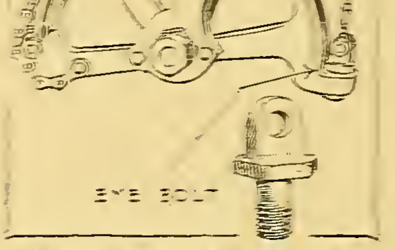
There is a legend which seems to have gained a good deal of credence, that the P. and M. engine is a low-compression one. I personally consider its compression anything but low, and even with the half-compression engaged there are times when a very considerable strain has to be put on the kick-starter to get the engine on the move.

The weak points I have found are that the bolt to which the chain is anchored at the front end of the quadrant is much too frail for its work, and tends at first, finally breaking off; then the ratchet teeth inside the half-time box are apt to jump each other, especially if the chain is a little too tight, and that the crank pin on which the rider's foot pushes is much shorter than the width of the average boot, and there is nothing to keep the foot from slipping off. My foot has slipped off several times, and when this happens one is apt to give one's ankle a nasty jar.

To remedy the breaking of the anchorage bolt, I fitted a flanged eye bolt with a [illegible]in. stem, drilling out the quadrant to suit; this bolt is tightened right down on to its flange, thus relieving the shank of the bolt of any bending moment; this destroys the value of the bolt as a means of adjusting the tension of the chain, and to take up the slack in the latter I have, when necessary, inserted a bolt of suitable diameter between the chain and the quadrant near the point of rear anchorage; the more the chain stretches the larger the diameter of the bolt that must be used.

To remedy the slipping of the ratchet teeth, I removed both the sprocket-shaft, which is carried in the timing case cover, and also the toothed nut which is screwed on to the crankshaft of the engine, and found that both sets of teeth had practically no undercut on them; they were neither of them dead hard, and could just be touched with a file, so were filed up to give a small amount of undercut to both of them.

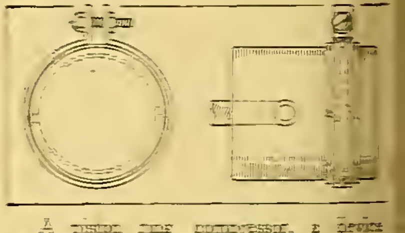
The foot pin was then taken in hand and a piece of [illegible] × 14 S.W.G. steel tube 4½in. long fitted just to push tightly on the existing pin. One end of this tu was belled out as shown, and the insi of the tube and the outside of the exis ing pin were both carefully cleaned a tinned with ordinary solder. The tu was then driven on (the belled end bei on the outside), and the two par sweated solidly together; this could done with a blow-lamp or large solderi iron, but I was able to put them bo into a bath of molten solder, which, addition to effecting the necessary fixi together of the two parts, coated t bare tube with a film of solder and made it unnecessary to nickel plate enamel it. This tinning of steel par with solder renders them quite rustpro—very much more so than ordinary pr sent-day electro-plating; it can be do at home, and if carefully done, and a superfluous solder wiped off while t article is warm, the effect is very mu that of unpolished nickel plate.—F.B.



Details of alteration made to P. and M. kick-starter.

INSERTING PISTON IN TH CYLINDER.

A DIFFICULTY is often experience when assembling an engine aft overhauling, in getting the pist rings to enter the cylinder.—



A piston ring compressor, a devic facilitating the insertion of the piston int the cylinder.

Obtain a piece of sheet steel 2in. longe than the circumference of the pisto ¾in. broad, and about $\frac{1}{16}$in. thick. Dr a [illegible]in. hole at either end, then bend the following manner:

Mark off 1in. from either end an bend at right angles after the mann of sketch No. 1, then place the piston top and bend to the same shape sketch No. 2. Insert a [illegible]in. bolt throug the two holes, and screw on a nut.

Place the band over the two rings in sketch No. 3, so that half the ring is showing; then draw the ba taut by means of the nut on the scre

Enter the piston in the cylinder un the band stops it from going furthe slacken off band, push piston further till the next ring stops it, place the ba on that ring in the same manner as t first, until finally all the rings are ente and the piston is in the cylinder.—G.J.M.R. (Dumbarton).

OCCASIONAL COMMENTS

BY "IXION"

Valve Spring Fixing.

I SHOULD estimate that valves have been responsible for more troubles on aero engines during the war than any other single detail. To some extent these troubles have arisen from factors which are not present on motor cycle engines—for example, the use of very light valves, air-cooled cylinders of abnormal size, and so forth. But I cannot help thinking that the pierced valve stem and cotter method of fixing the spring cap is obsolescent, and I wonder whether it will be retained on motor cycle engines after the war. A common method consists of turning three annular grooves on the valve stem, and shaping a couple of split cones to fit the grooves internally; the split cones are then locked to the stem by the spring cap under pressure of the valve spring, and when the spring is levered up the stem, the cones drop off and the valve is free. Such a system avoids weakening of the valve stem and simplifies the removal job.

Gudgeon Pin Fixings.

SIMILARLY, the number of new inventions in the way of gudgeon pin fixings is legion, though a few engines, including some of the best, retain he old grubscrew, which has cost so many of us a ong push ere now. The practice of fixing the pin in he little end of the connecting rod and fixing the ushes in the piston bosses is growing. I have yet o see anything better and simpler than pushing a soft teel or copper tube through the pin and burring the nds over.

Rotary Oil Pumps.

MUCH of the prejudice against mechanical oiling on motor cycles is due to the use of ball valves, which did not prove too reliable in the small izes to which motor cycle engines were restricted. Fast-running gear pumps stand up surprisingly well, ut add another mechanical movement, which some iders consider objectionable. There is now a sweet ittle pump on the market, which cannot be described or the moment; it is of the rotary type, and could asily be accommodated on our engines. It is cheap o make, absolutely silent in action, and as reliable as nybody could wish.

Spare us One Designer.

THE last three paragraphs are straws which show which way the wind blows. They may serve to indicate that most of the old conventions have een shattered by the war; that a new school of petrol ngineers has arisen, most of whom are young men nd unknown to fame in the pre-war motor trade—ven in the car trade. If a few of them can be ragged into the motor cycle trade after the war we hall get a very healthy infusion of fresh blood, which will stimulate an industry formerly in some danger of getting groovy. Of course, the obvious danger is that the best of these new men will enter the higher walks of engineering when peace returns, especially if the aviation industry continues to develop as men like Lord Montagu and Mr. Holt Thomas prophesy it must. The motor cycle trade could find magnificent opportunities for two or three of these men, and it is fervently to be hoped that we shall secure them.

Half-guinea Carburetters.

I NEVER secured a decent carburetter for the eight shillings which "Cairnock" regards as a rational price, but I well remember purchasing a 10s. 6d. float-feed from Gamage's in the very early days. It replaced a curious little abomination concealed inside the tank of my 2 h.p. Werner, which boasted a special compartment with knife-like edges for the purpose. Since then, doubtless for excellent reasons, the price of the simplest types of float-feed has advanced to the neighbourhood of £3. There is rather more metal in them nowadays, and they are more scientifically shaped and dimensioned, but the extras secured for the additional cost really amount to piston valves in lieu of a butterfly throttle and rotary disc air inlet, and handle-bar control instead of a bit of rod split-pinned to a lever stuck on the tank. There *ought* to be some money in carburetter making these days, but I have no doubt the manufacturers can prove that they barely pay their way.

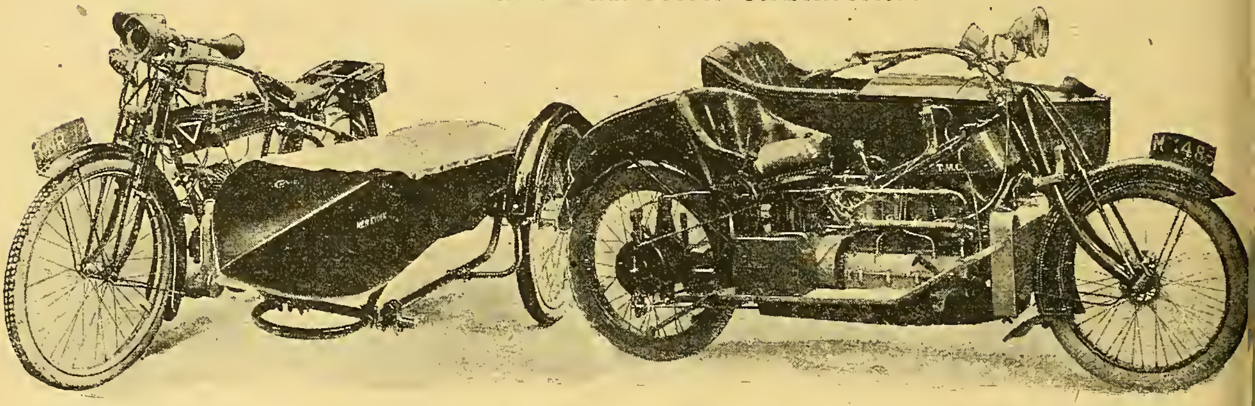
Too Technical?

AS I studied sundry expert contributions to *The Motor Cycle* of April 11th, I noticed, first of all, that the war has made our popular weekly far more technical than it used to be; this, because so many of our readers have advanced their technical education through training in various engineering corps. Secondly, it occurred to me that the technical conscience is a very restless and fastidious organ. For example, we have Mr. Mackay bewailing the inefficiency of the two-stroke, and "Wharfedale" lamenting over the horizontal couple of the flat twin; and both of them were thoroughly justified—from a technical standpoint. In actual riding, nobody minds the inefficiency of the two-stroke, and nobody notices the horizontal couple of the flat twin. If somebody markets a big air-cooled two-stroke (say, a 4 h.p. vertical single) which will keep cool, it will sell like hot cakes, because it has a pleasant exhaust and is easy to look after. As for the F.T. four-stroke, it is apparently going to boom after the war because it is vibrationless, and because its practical defects are less obtrusive than those of the single and the V. More power to the elbows of the plucky engineers who are striving to improve these promising engines. But our standpoint, as riders, is that with all the faults which experts can find in them, we love them still.

THE POST-WAR SIDECAR OUTFIT.

Possible Types with the Main Points of each considered.

EXTREMES IN SIDECAR OUTFIT CONSTRUCTION.



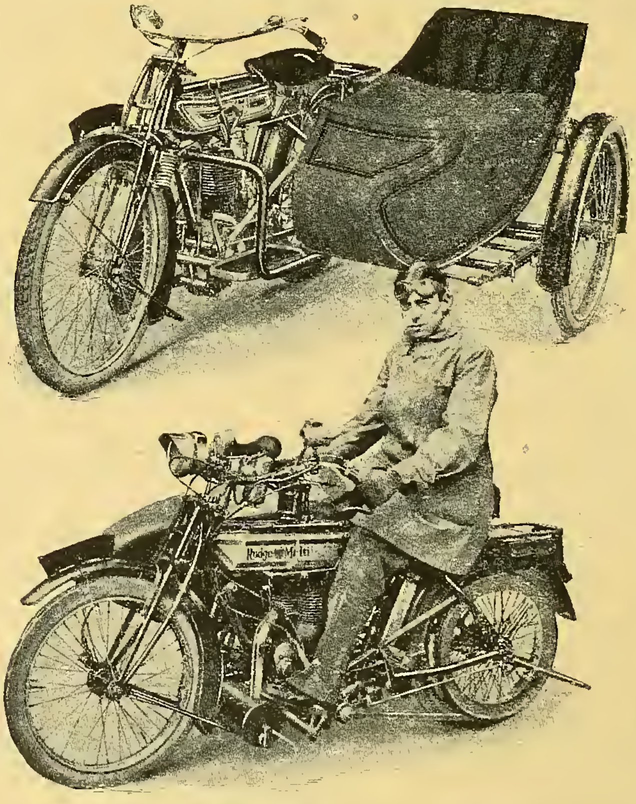
The combination on the left is a two-stroke, to which is attached a very light sidecar. Needless to say, any very serious touring is out of the question with such a combination. On the right is a water-cooled four-cylinder, which, as may be seen, is quite at the other end of the scale.

THAT one man's meat is another man's poison is never nearer to the truth than when we consider the almost equal number of supporters of the single and the twin. Hence in this article no attempt is made to find the ideal motor cycle for a sidecar combination, nor even a type most suitable for the majority.

The Question of Engine Power.

When one enquires of a friend the type of machine he will have after the war, the reply sometimes is a superficial quotation of the makers' horse-powers. One man may say "a 3½," another "a 5-6," a third "a big twin." In many cases, especially with those who were only just taking up the pastime when war broke out, riders have but a hazy idea regarding "types" as distinct from "sizes." One man may have had satisfactory service from a "3½" single but has fallen in love with a friend's twin, and intends to combine his ideal "size" with his friend's "type." We think it is generally agreed that, as a rule, to give the same power as a single, a twin must have at least 25% larger capacity.

TYPES OF SINGLE-CYLINDER SIDECAR OUTFITS.



(Top) The 3½ h.p. outfit, a well-tried type which will have many adherents after the war.

(Bottom) The big single attracted many people, because considerable power was coupled with the utmost simplicity of design.

When a rider advocates a "5-6" or "6-7" twi very often the mystic numerals are taken as size whereas if he went deeply into the matter he may fin that some of the nominally smaller engines are larg in capacity than those t which the makers ha given a higher nomin power.

To remove these an malies makers shoul come to some decisi among themselves to sta dardise a unit for pu poses of "nominal sizing" their engine and for this purpose unit of 100 c.c. capaci per h.p. appears to t the most simple, and, f that matter, approx mately correct also f normal type engines.

The Single.

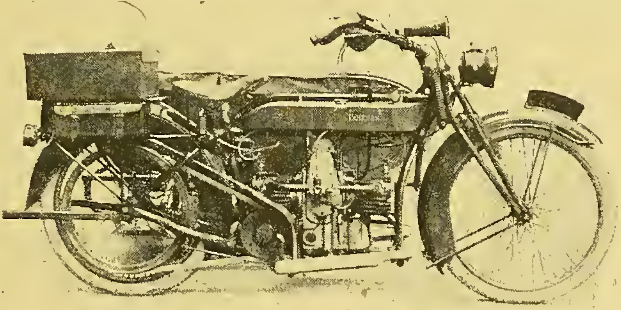
Taking the singles firs those who prefer the co parative simplicity of t "single lunger" may ha a variety of machin from which to choos At the present time the are three sizes availabl The 3½ 500 c.c. clas the medium size su as the Triumph, B.S.A and James "fours;" a the "big" single, class represented by t Norton "Big Four the Rudge 5-6, and t Excelsior 8.

he Post-war Sidecar Outfit.—

The engine sizes of these machines are as follow:

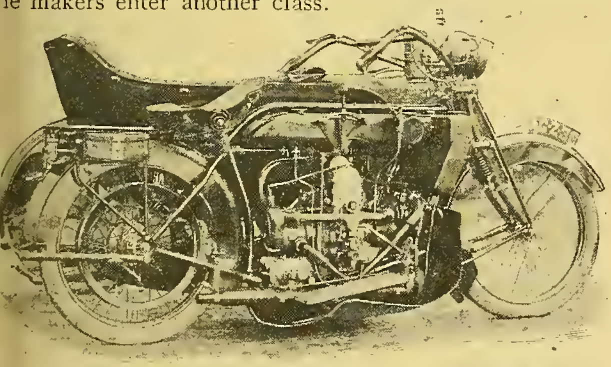
½ Class—		
Many makes	85× 88	499 c.c.
Iedium Class—		
Triumph 4	85× 97	550 c.c.
B.S.A. 4¼	85× 98	557 c.c.
James 4¼	86×103	600 c.c.
.arge Class—		
Norton Big 4	82×120	634 c.c.
Rudge 5-6	85×132	750 c.c.
Excelsior 6-7	96×112	800 c.c.

In the single class the "3½," so popular before he war, is the smallest engine from which one may xpect any degree of satisfaction. One may say, in act, that the 500 c.c. engine is too small for sidecar vork, but, provided the loads carried are fairly light, he country in which it is used not too hilly, and too nuch in the way of high average speeds is not xpected, this size will give a great deal of good ervice. We think, however, that a slightly larger ngine will be favoured more after the war: the size nown as "the four," and termed here the medium ingle. The few extra cubic centimetres in the apacity of the cylinder make a surprising difference, vhich shows that with a 500 c.c. "3½" one is running iearer the limits of its power than is desirable. The iedium single undoubtedly is a truly satisfactory idecar machine, and, rovided such luxuries as wo-seater sidecars with ood and screen do not orm part of one's post-var requirements, will ive as much all-round atisfaction as a larger iachine, unless the rider s keen on high speeds nd aspires to take every teep hill at a fast pace.



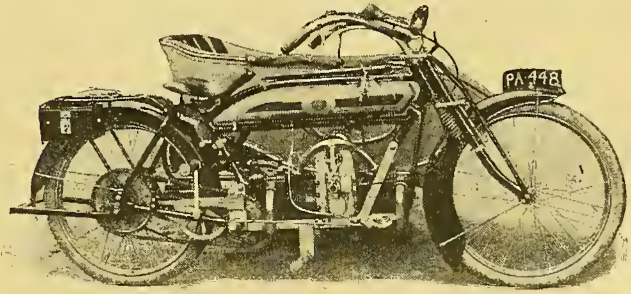
A flat twin outfit of 4 h.p., which will be an attractive sidecar outfit to many who desire a smooth running engine and a double purpose mount.

As regards the "big ingle," there is a marked endency for makers to bandon this type. It is ractically certain that the Norton large single will be post-war machine, but so far as can be ascertained t the present time it appears extremely doubtful hether the other large single cylinder machines will e marketed. If they are abandoned their place in ll probability will be taken by large twins, hence ne makers enter another class.



The 6 h.p. flat twin is a proposition that many makers will seriously consider after the war. Already there are half-a-dozen hat are, or have been, on the road.

The Twin.



The 3½ h.p. flat twin and sidecar. A 500 c.c. twin is on the small size for sidecar work, but is capable of giving great satisfaction under fair conditions.

In the twin class we have a greater range, both in size and choice of make. Beginning with the Douglas flat "four," there are many different sizes going up to approximately 1,000 c.c., both in the V and the flat types. Below the 594 c.c. 4 h.p. size there are other twins used for sidecar work. The 500 c.c. V twin was becoming very popular when war broke out, but usually the 500 c.c. twin does not give the same power as the 500 c.c. single, and as the latter is generally under-powered for sidecar work, one may rule out the twin of this size as being below the mark of practicability.

This class of machine can be divided into two types—those with V and those with flat engines. In the V division we have a large selection ranging in size from approximately 650 to 1,000 c.c., and nominally termed 5-6, 6-7, 7-8, and 8 h.p. The first three sizes mentioned may be termed the middle weights, and the last the 'big twins." The middle weights probably give all the power necessary for any class of sidecar work and are comparatively inexpensive to run, while the big twins give a large reserve of power, which, while being unnecessary, is a luxury well worth the cost if it can be afforded.

In the "flat" division the sizes begin with the Douglas 4 and go up to the Williamson 8, with such machines as the Brough 5, Humber 6, Matchless 7 in between, and as, theoretically at least, the flat twin has certain advantages, such as perfect balance, even firing, etc., there is little doubt that it will be a very popular type in the future.

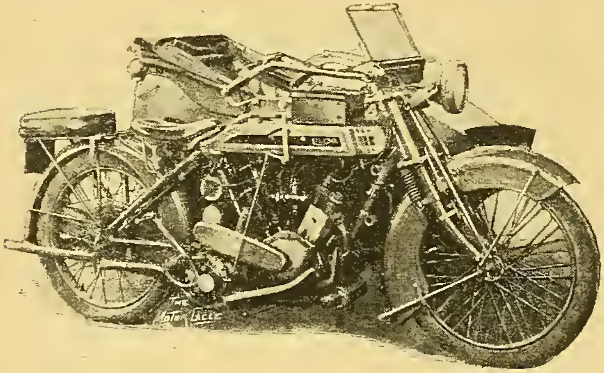
The Four.

There is one more type to be considered, the four-cylinder machine, and although no British makers at present market such a proposition, there is a marked tendency for riders to favour the type as a sidecar machine-de-luxe. If this tendency develops, it is to be hoped that British manufacturers will come forward with a suitable design, as no one will care to see the topmost class of motor cycles an imported article.

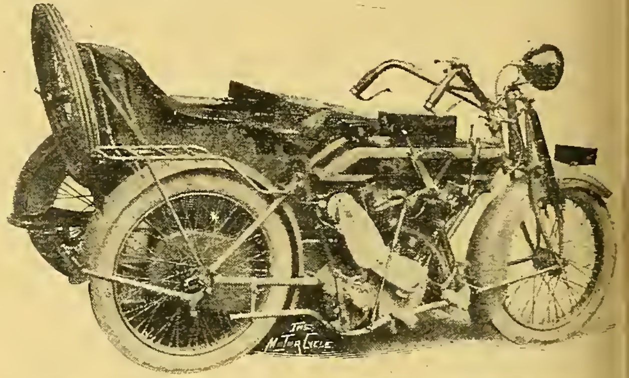
The Post-war Sidecar Outfit.—

As regards the sidecar part of the combination, almost every rider agrees that we still have a long way to go before the makers can write finis to their designs, and there is a strong feeling that combinations should be designed as combinations—a sidecar in every way suitable for the machine to which it is fitted—and not units designed and built by separate firms as a universal pattern. One sees more sidecars fitted incorrectly to their machines than those which are in true alignment, with the result that the majority of sidecars on the road to-day have earned for the sidecar combination the appellation of "unmechanical."

TYPES OF POWERFUL TWINS.



The 5-6 h.p. combination, possibly the most favoured class of passenger motor cycle.



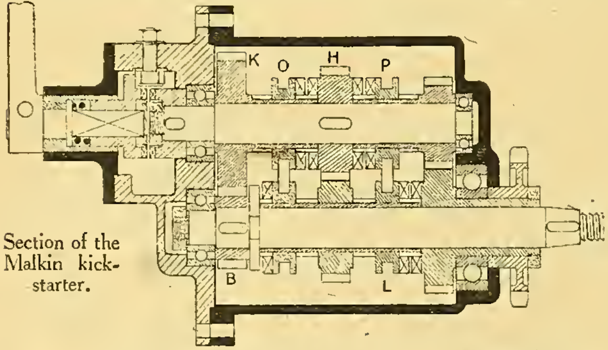
The powerful 8 h.p. twin has many adherents, and there is much to be said in favour of possessing plenty of power.

AN IMPROVED FOUR-SPEED GEAR.

Modifications to an Attractive and Original Design.

In our issue of February 21st (page 176) we described and illustrated a four-speed gear box incorporating a kick-starter, designed by Mr. B. Malkin, of Leith. Mr. Malkin has recently somewhat modified his original design, and we reproduce an illustration of the gear box in its latest form below.

The designer writes: "Since making the original drawings I have hit on an idea for a kick starter which still further simplifies the gear box. The engine is started with L and P in neutral and O in engagement with H. A ratchet collar is fixed on the end of the layshaft, which can engage with another on the kick starter. These are normally held out of engagement by a small roller acting on the inclined face of a projection on the kick starter collar. The first movement of the kick starter allows the two ratchets to come together, and the engine may then be started through the wheels K and B."

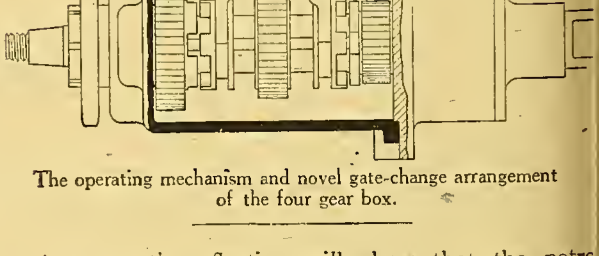


Section of the Malkin kick-starter.

Operating Mechanism for Four-speed Gear.

The gear itself is operated by a gate change of somewhat unusual design. The bar B can receive an oscillating movement and a sliding movement from the change speed lever. The ball-ended lever A can oscillate, but is prevented from moving on end, and is mounted on a squared portion of the bar.

The right-hand pair of clutches are operated by the sliding movement of the bar, and the left-hand pair by the oscillating movement of the ball-headed lever in the inclined slot in the fork.



The operating mechanism and novel gate-change arrangement of the four gear box.

A moment's reflection will show that the petro shortage must survive the war by a tolerable period. The various Services will have inconceivable tons o stores to tidy up. The world's aeroplanes will not b left to rust just where the signing of peace happen to catch them. Sunk tank steamers will not bo merrily up to the surface when peace is declared. Th dear old days will not return, nor Dora decease, th instant the Kaiser cries "Kamerad."

LONG v. MEDIUM STROKE ENGINES.

Some Comparisons made on the Basis of Equal Cubic Capacity.

IN his recent article, "The Case for the Long Stroke," Capt. Lindsay made quite a convincing statement on behalf of his favourite type of engine from the standpoint of the practical rider. The main factor which vitiates his arguments, however, is that in no instance is a definite comparison made between a long and a medium stroke engine identical in all respects save that of stroke-bore ratio. The engines Capt. Lindsay selects for comparison are by different makers, or else they are of different cylinder capacities, or run at different speeds. Indeed, the assumption throughout is that the long stroke engine will be a slower running machine than its competitor, which is distinctly unfair to the short stroke engine. Speaking as a mere theorist, I think, too, that Capt. Lindsay deals too cavalierly with us in dismissing our efforts with the words, "The theorists have told us all about it." A good deal has admittedly been written on the mathematical aspect of the question, but hardly all that *might* be written.

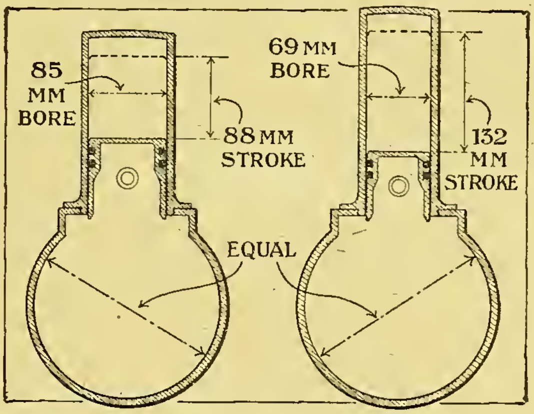


Diagram showing relative sizes of the two engines discussed in this article.

Even the few suggestions that I propose to offer will tend to show that the unprejudiced theorist can bring forward much additional evidence in support of Capt. Lindsay's conclusions. The armchair investigator has the advantage over his colleague of the broad highway, inasmuch as he can adopt from the outset what is, after all, the only rational and impartial plan, *i.e.*, to compare what may be termed average engines of each class, putting them on the same footing, as far as possible, in every respect; for I take it that the object of the enquiry is not so much to decide whether the long stroke "Eureka" is a better machine than the medium stroke "Primus," but whether the long stroke principle is more scientifically sound than that embodied in the rival engine. Let us, then, consider two engines of equal cylinder capacity, speed, and horse-power, the stroke of one engine, however, being one and a half times that of the other. For convenience the medium stroke champion will be assumed to have a bore and stroke of 85 mm. and 88 mm. respectively, while the corresponding figures for the long stroke representative will therefore be 69 mm. and 132 mm.

Since it is postulated that the explosion pressures in the two cylinders are identical, manifestly the total thrust on the piston of the medium stroke engine—for brevity, piston "M"—will be one and a half times the thrust on piston "L." It is not unreasonable to make the further assumption that the designer of the typical engines we are considering will proportion his bearing areas to suit the loads which fall on them. Consequently we may expect the gudgeon, crank pin, and main bearings of "M" to have one and a half times the area of the corresponding bearings in "L"; this will ensure that the bearing pressures *per square inch* are identical, which in its turn implies that the corresponding bearings in the two engines will wear equally well. An exception may perhaps be made in the case of the gudgeon pin, the greater arc of swing of the "L" connecting rod possibly being responsible for slightly greater wear in the "L" small end bush than in the "M" bush.

(a) Balance.

Coming now to the question of centrifugal pressures, it may be said at once that the rival engines are so nearly on an equality in this respect that careful enquiry must be made if a just decision is hoped for. Since these forces vary directly with the weight of the reciprocating parts, it will first be necessary to make an estimate of the relative weights of the typical engines we have selected for consideration. If we assume that all the dimensions of the "L" reciprocating parts bear the same proportion to the corresponding dimensions of the "M" parts as do the respective cylinder bores, we can say at once that the weights will vary as the *cube* of the bores—that is, that the "M" parts would be $\frac{85^3}{69^3} = 1.86$ times as heavy as the "L" parts. It is extremely improbable, however, that this relation will hold; for example, the thickness of the metals of the two pistons would be practically the same, instead of varying with the bore. Arguing on these lines, it would be found that the weights would vary as the *square* of the piston diameters, *i.e.*, weight of "M" parts $= \frac{85^2}{69^2} = 1.5$ times weight of "L" parts. The real relation between the weights will lie somewhere between these values, and in the absence of more reliable guidance we cannot do better than take the average, leaving us with the result that if "L" parts weigh 1 lb., "M" parts will weigh 1.68 lb.

We are now in a position to calculate the actual extent of the centrifugal or inertia forces. As has been shown in these columns, a single-cylinder engine under even the best conditions will always be out of balance to the extent of at least one-half of the maximum inertia force. In the present instance, since the speeds are the same in the two engines, the unbalanced forces will be proportional to $W \times R \times \left(1 + \frac{R}{L}\right)$, where W = weight of reciprocating parts, R = crank length, and L = length of connecting rod. If we take $L = 5 \times R$ in the case of "M" engine, we shall have $L = 3.33 \times R$ in "L" engine (assuming the rods to be of the same length). On substituting the

Long v. Medium Stroke Engines.—

various values in the formula, we are left with the result that the unbalanced force in the long stroke engine is 0.97 times the force in the medium stroke machine, or, in round numbers, they have identical values! Put more simply, the balance in the two engines is equally good (or equally bad)!

(b) Wear.

The effect of this rather remarkable result on the amount of wear likely to occur in the two engines is very problematical. Although the actual inertia forces are roughly the same in both cases, the bearing *pressures* due to these forces will undoubtedly be more severe in "L" engine on account of the smaller area of its bearings. But it must be remembered that during the compression and explosion strokes the inertia forces act more or less in opposition to the forces due to the pressure of the compressed or ignited gases on the piston; consequently during these periods the net amount of wear on the bushes is practically independent of the inertia pressure. In any case all fear of excessive wear on this score can be eliminated by allowing a slightly more generous bearing surface than is necessitated by the mere explosion pressures.

(c) Mechanical Efficiency.

On a "first approximation," as the mathematicians have it, the short stroke engine has the advantage in this respect. Taking the loss of energy in piston friction as being proportional to piston stroke × piston circumference, we obtain relative values, for "L" and "M" respectively, of 28,600 and 23,500. No account is here taken of the reduced length of skirt of the "L" piston, with its accompanying reduction in the area of oil film to be sheared; so that actually the figures would not be quite so favourable to the medium stroke engine as the above values appear to indicate. Besides, the friction loss in the rotating parts—crank pin and journal bearings—will unquestionably be less in the "L" engine, not only on account of the lighter loads which fall on them, but because of the smaller radius at which the friction acts, due to the reduced diameter which may quite safely be given to these rotating elements. On the whole, therefore, and in the absence of experimental data, we are scarcely justified in claiming a score for the "M" engine on the ground of overall mechanical efficiency.

(d) Cooling.

This is a characteristic in which theory is entirely in accord with Mr. Lindsay's practical conclusions. For purposes of rough calculations we may say that the area exposed to atmospheric cooling effects is proportional to piston stroke × piston circumference + piston area. On this basis we find the long stroke engine to have 32,340 units of cooling surface, as against only 29,160 units for its competitor, a clear gain of about 11%.

(e) Compression.

Since the area of the path of escape open to the compressed gases in the cylinder varies directly with the piston diameter, it is clear that the long stroke engine will retain its compression longer than the medium stroke type, or, rather, the proportion of gaseous mixture escaping past the rings will be less in the one case than in the other.

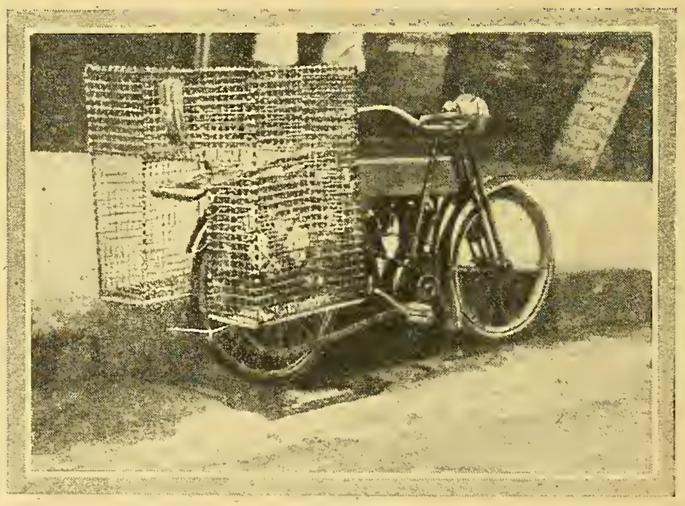
To sum up, then, it can be said with confidence that the short stroke engine possesses no single feature in which it scores decisively over its rival; so that evidently the secret of its popularity must be sought in a region inaccessible to the mathematician. And since these influences are therefore most probably based on individual prejudices and opinions, there is every prospect of many lengthy and exciting discussions occurring before the question is finally settled—if ever it is!

MOHANDIS.

◆

Carrying Light and Bulky Luggage.

An ingenious luggage carrier for motor cycles has been devised by a Los Angeles man who is engaged in delivery of light but bulky merchandise. The device is composed of heavy wire mesh, and hangs low on both sides of the rear wheel, giving unusually large space for the contents. The luggage carrier will carry almost as much as a sidecar and is cheaper, but it is questionable whether anyone but an expert rider could manage a big load in the traffic of city streets, to say nothing of driving in grease.


A wire luggage carrier of ample dimensions used for delivery of light goods.

Although the idea is, to say the least, unconventional, there is more in it than one may imagine at a casual glance. There is no reason why a wire carrier should not be introduced in place of the usual heavy wooden sidecar body. A much larger space would be available, and weather-proofing would be quite a simple job. Those who so vigorously decry passenger carrying on the luggage carrier will have much to say, but even so we may be regularly seeing this luggage-carrying device in use.

Easy Starting
Under All Conditions

"The other night the bike was left out from 12 a.m. to 8 a.m. in a blinding rain storm. When I got to her in the morning she started up with the first kick."

Extract from a letter received from Dr. G. H——, of Shetland.

Art Catalogue post free.

ARIEL WORKS, Ltd.,
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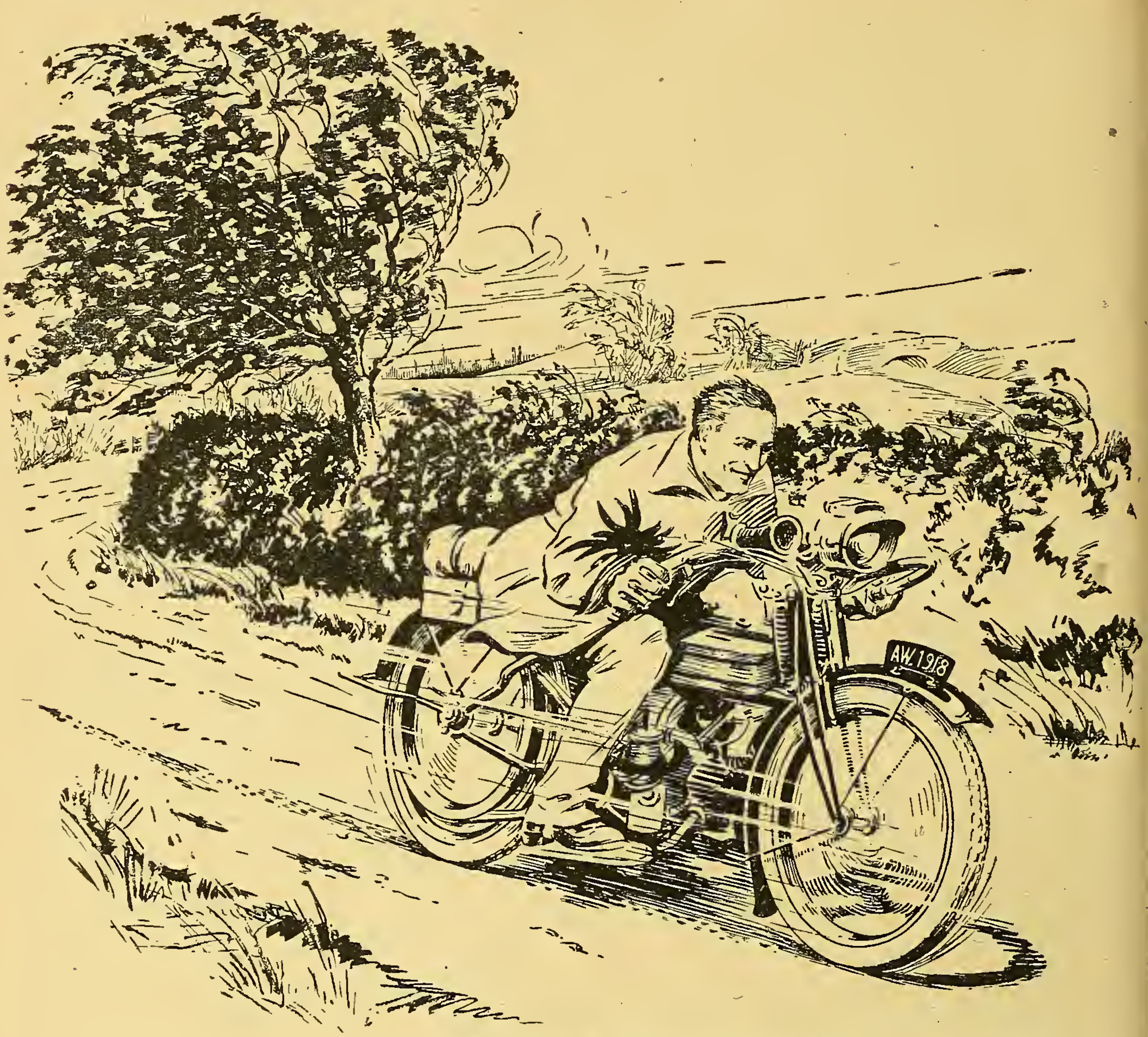

LET me ride with the wind on my forehead,
The beat of the air through my hair!
Let me face the rush of its passing—
The open, sweet, God-given air.

Let me face the wind in the evening,
Let its coolness revive my soul;
Let me pass from the glare of the pavement
To places where God makes men whole.

Let me feel the wind on my temples
When I answer the Last Great Call;
Let my spirit go out in a windstorm,
Clean, pure, on my last ride of all.

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MILITARY NOTES.

Motor Cycling in Tropical Africa. Battle of the Tanks.

DELAY IN THE MAILS.

' is expected that there will be considerable delay in the arrival of mails which left Egypt on April 4th, conning about a fortnight's correspondence m Egypt and the Palestine Front. ssibly some of the mails have been lost.

* * *

IE NEW MILITARY SERVICE BILL.

R. MACPHERSON was asked in the House of Commons what arrangements, if any, would be made that men called up under the new litary Service Bill, who, from their alifications in civil life, would be elig- for officers, could obtain commissioned ık; also, whether time-expired men o, when they left the Army, had oh- ned non-commissioned rank, if called under the provisions of the new Bill, uld take the rank they occupied when y obtained their discharge. He replied it both matters were under the con- eration of the War Council.

* * *

THE POST-WAR SIDECAR.

GT. WILLIAMSON, R.E., writing from France, speaks of the days before the war and the fascination choosing a new mount. He writes: Ve get a glimpse sometimes of what might have been. Occasionally one is able to forget, and for a few moments indulge in flights of fancy. Of the horrors we have been through recently, I will not speak; no doubt you have heard plenty of stories.

"As I write, my thoughts go back to 1913. In April of that year I remember hesitating a good deal whether I should buy a single or 5-6 h.p. for sidecar work. I finally decided on a 4 h.p. Triumph, and many times during the summer regretted I had not plumped for the extra power, although the single behaved admirably. Without any doubt whatever, I shall go in for the big twin if I get through this nightmare all right. Nearly all my riding in France has been on singles, and I crave heartily for the big twin. That reminds me of a discussion I read some time ago in *The Motor Cycle* on the question of big twin outfits. Someone asserted that the 8 h.p. sidecar outfit was doomed, and that people who could afford such a combination would spend a little extra and go in for the cheap light car. My own opinion is that such an idea is rubbish. There will not be a four-wheeler comparable in reliability and speed with the powerful sidecar. The sidecar will for me always have a greater fascination than the cheap four-wheeler, and I guess many other motor cyclists will echo these sentiments."

THE BATTLE OF THE TANKS.

MR. PHILIP GIBBS, the *Daily Chronicle* special correspondent, in his narrative of the Battle of the Tanks, in the recent fighting round Villers-Bretonneux and in Hangard Wood, says:

"German tanks, though heavier than ours, with bigger guns, have now beaten a retreat, leaving one of their type in No Man's Land. It has a high turret and thick armour plates, and is steered and worked on a different system from ours. One of them was killed by a tank of our old class, and then we put in some of our newer, faster, and smaller types, which can steer almost as easily as motor cars, as I know, because I have travelled in one at a great pace over rough ground. These set out to attack bodies of German infantry of the 77th Division, forming up near Cachy. It was a terrible encounter, and when they returned this morning their flanks were red with blood.

"They slew Germans, not by dozens nor by scores, but by platoons and companies. They got right among the masses of men, and swept them with fire, and those they did not kill with their guns they crushed beneath them, manœuvring about and trampling them down as they fell. It seems to have been as bloody a slaughter as anything in this war."

* * *

FROM NYASALAND.

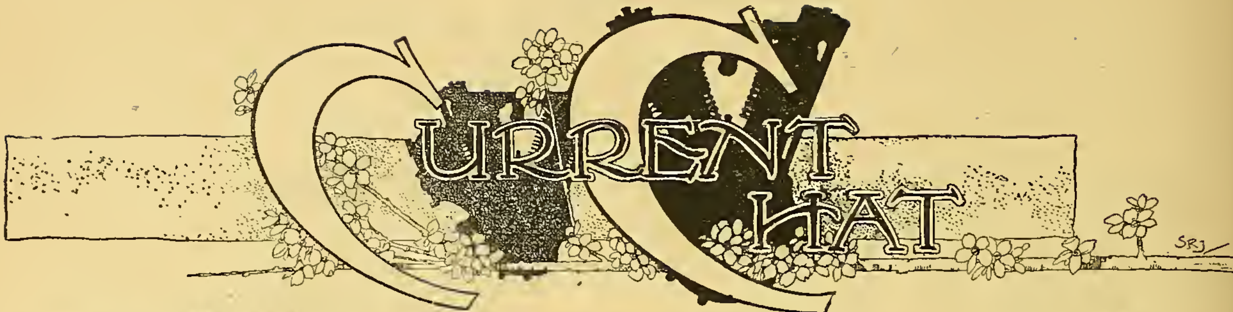
AN interesting letter has reached us from Lt. G. W. Mathieson, of the South African Motor Cyclist Corps, Nyasaland. In it he speaks about the difficulties encountered by the despatch riders in Central Africa, and, judging from the photographs he sends, one can easily understand the difficulty of motor cycling in that country. Obviously it is no pleasure trip to be trekking in Nyasaland.

Lt. Mathieson says that *The Motor Cycle* still reaches them, and generally goes the round of the camp.

MOTOR CYCLING UNDER DIFFICULTIES IN TROPICAL AFRICA.

(Top) A very bad incline, necessitating a rope and four men to manœuvre the machine. Such hard going tests one's riding abilities to the utmost. Slippery black earth with tree roots over the path are quite the usual thing.

(Bottom) A typical jungle path. The dense undergrowth has frequently to be cut away before a passage can be made.



CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

May 2nd	... ...	8.52 p.m.
,, 4th	... ...	8.55 ,,
,, 6th	... ...	8.58 ,,
,, 8th	... ...	9. 0 ,,

Call for Women Orderlies.

Women orderlies are urgently required for military hospitals in France.

British Postmaster at Jerusalem.

Sgt. Frank H. Smith, R.E., is the first British Postmaster at Jerusalem.

Motors in Singapore.

The 1917 imports of motor cars and motor cycles into Singapore are reported to be more than 75% larger than during 1916.

The County of Middlesex Motor Volunteer Corps.

With further reference to an appeal for motor cyclists from Mr. K. Ballard, the County of Middlesex Motor Volunteer Corps, Central Group, 406, Euston Road, London, N.W.1, which appeared in last week's issue, we have had another communication from this gentleman, urging the great need of motor cyclists at the present time. Their services will not be required at the moment, but only in the case of extreme national need, such as a threatened invasion, but it is most essential for the military authorities to know upon whom they can call in the event of an emergency.

Three Motor Cycles for £9.

At the auction sale at Woolwich on Thursday last week of "unserviceable and obsolete" ordnance stores, Lot 178, "three motor cycles," fetched £9, and forty-three magnetos, sold in lots of ten, fetched £1 each. A Russell motor car realised £12 10s., and "5 cwt. of old motor cycle belts" £4. 25 cwt. of old motor cycle tyres £16 10s., and 12,000 boxes of Tyreroid for £12, seem to tell a tale.

600 Cwt. of Motor Cycle Tyres!

Lots 67 to 72, 600 cwt. of motor cycle tyres, were withdrawn, although catalogued as having been on view at the A.O.D. Stores, Angel Mills, Edmonton. Other lots included 2,500 motor tyres, plain and studded. In lots of 100, they averaged about £25. Inner tubes fetched £2 to £3 more. Cycle fittings, frames, rims, brakes, forks, and handle-bars, motor lorry wheels, batteries, "vices of sorts," old boots, rope, iron, wood, etc. Most of the stores had been on view at Woolwich Arsenal and dockyard.

Boys no longer accepted for the R.A.F.

We are informed by the Air Ministry that the enlistment of boys between fifteen and seventeen years of age in the R.A.F. is no longer possible, and that this branch of the Service is closed indefinitely. Lads between the ages of seventeen and eighteen years, preferably with technical experience and capable of doing a man's work, can be enlisted as such, and paid at the rate of third-class airmen, namely, 2s. per diem.

Anglo-American Commercial Relations.

In order to facilitate the development of trade between this country and America, a Committee on Laws and Arbitration has been set up. The object of this committee, which is working in conjunction with the American Chamber of Commerce in London, is to effect the setting up of a body for arbitrating in any commercial disputes that may arise between firms in this country and in America. Either would be suspicious of a decision given in the other's law court—the average Englishman's opinion of American justice is proverbial. The scheme is not simple of accomplishment, but there is every hope of success.

Special Features.

POST-WAR COMBINATION.

LONG v. MEDIUM STROKE.

A.I.D. LADY D.R.'s.

Interest in Motor Cycles.

We frequently meet soldiers and e
soldiers, who had no interest in mot
cycles prior to the war, who now displ
keen interest in motor vehicles generall
and many, no doubt, will join the ran
of the motoring fraternity.

A Plea for the Merchant Service.

We certainly think a great injusti
is done to officers and men of t
Merchant Service, who are doing su
magnificent work and undertaking gre
risks in keeping the country suppli
with food and other necessaries at t
present time. As matters stand at t
moment petrol is only granted to offic
and men on leave from the Army a
Navy from foreign service or from t
Grand Fleet, but we certainly think th
the Merchant Service should receive d
consideration in this respect.

A machine gun being fitted to a sidecar for use in an emergency. (*Official.*)

Var Services.

The Women's Legion is now to be nown as the War Services Legion.

etroleum in Brazil.

Engineer officers have discovered in he State of Parana, Brazil, a rich leposit of petroleum, which is to be vorked by the State.

verseas Trade.

A committee has been appointed to dvise the Department of Overseas Trade Development and Intelligence) on matters elating to the activities of the department.

Iotor Tandems.

Some of the first motor cycles were andems. Considering the vogue in illion riding, it is surprising that Patent Office patrons have not designed modern motor tandem.

ady Motor Cyclists Wanted.

The Women's Legion, 15, Pall Mall East, London, S.W.1, is still open to eceive as recruits lady motor cyclists f good education who have had some xperience in riding. At the present ime there is no difficulty in obtaining nexperienced drivers, but those who ave had, say, four months' driving are ot so easy to procure.

ishop calls up Clergy.

Though the clergy have been exempted rom the new Military Service Bill, the ishop of London intends to call up hose in the Diocese of London who vould have been liable had the Bill een passed as it was originally drafted. Ie declared that exemption was not esired by the clergy.

Motor Car for Sixpence!

Those who want a chance of obtaining four-seater Wolseley motor car for 6d. hould write to J. Pepper, of Pepper's arage, 63, Piccadilly, Hanley, Staffs, ho is presenting one of these famous rs to the Hanley Red Cross effort. The raw will be conducted by the officially ppointed Prize Drawing Committee on une 29th, 1918, at the Town Hall, Ianley, and the winning number will be nnounced in *The Motor Cycle*. Applications for tickets should be sent to the ddress given above.

etrol for Sailors on Leave.

It has already been stated in these ages that petrol is granted to soldiers n leave from Overseas, and sailors on ave from service at sea, but as there eems to be a little doubt in the minds f some people as to how matters are rranged as regards the officers and men f the Royal Navy, we may state that e Petrol Controller's Department endeavours to treat the Navy men in exactly e same way as soldiers.

Officers and men from the Grand leet only get their leave at comparatively rare intervals, and these present difficulties, but officers and men oing certain work which gives them a ort respite on shore—say once a month—cannot have petrol licences granted to em on every one of these occasions, d it may be safely said that short-time etrol licences to officers and men on ave from the Fleet are only granted, y, once every four months.

Canadian Motor Cycle Show.

An exhibition of cycles and motor cycles will be held from May 4th to 11th at the Auditorium, Montreal, under the auspices of the Montreal Bicycle and Motor Cycle Dealers' Association.

Commendation for Motor Cyclist Specials.

Sergeant Freedman and Constables S. C. Willshear and S. C. Rathbone, of the motor cycle detachment of the Special Constabulary, London, have been commended for plucky service.

Motor Cycle Stolen.

About 3 p.m. on Saturday, April 20th, 1918, a twin-cylinder Harley-Davidson was stolen from outside the Canadian Records Office, 15, Tudor Street, London, E.C.4. The registered number is LR 3881, engine number L17, T5366. A reward of £10 will be paid to anyone giving information leading to the recovery of this machine. Communications should be sent to Capt. J. S. Watkins, Canadian War Records Office. Telephone: City 3210, and Western 1309.

The Ladies of Pervyse.

We are pleased to hear that Miss Chisholme has almost entirely recovered from the effects of the gas poisoning to which we referred recently in this journal. The Baroness de T'Serclaes, however, is still in a nursing home, and has, unfortunately, not yet been completely restored to health. Beautiful coloured photographs of these two ladies were shown at the exhibition of war photographs at the Grafton Galleries, Bond Street, London, W., which closed last Saturday.

Coal Gas.

Of late we do not hear much about motor cycles with coal gas installations.

The Ramsey Oil Well.

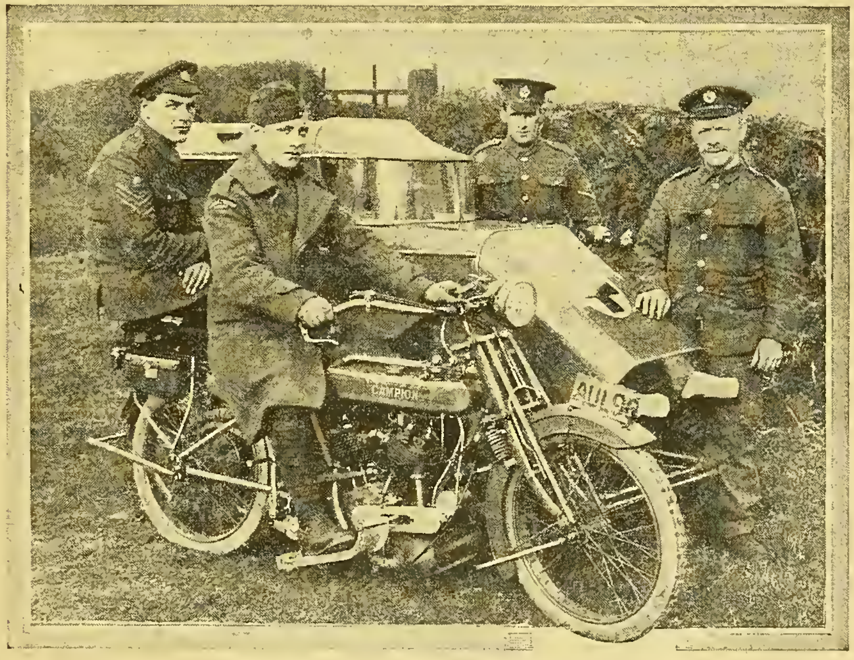
Ramsey's well continues to yield from two to three gallons of oil daily. No Government action has yet been taken.

Road-making after the War.

One of the peace aims of the A.A. and M.U. is to bring about "the employment of the Army on road making during demobilisation." What will the Citizen Army think of this? We all want good roads, but to suggest that they be built by the defenders of civilisation shows poor appreciation of their services.

"Ixion" and Lubrication.

A few weeks ago our contributor "Ixion" referred to Reg. Holloway's ride from Coventry to London on a single pump-charge of oil. We are reminded that Maj. Holloway—for such is his rank now—charged his crank case with about a tumblerful of oil, then emptied his oil tank. For the first few miles stops were made every few hundred yards to clean the sooted plug. The distances between stops grew greater every time until about twenty miles out of Coventry he was able to proceed without trouble. Holloway rode slowly; at no time did his speed exceed 15 m.p.h., and the distance covered was about 110 miles, when the crank case was found to contain about half the fluid put into it at Coventry. We repeat our comment at the time, that no useful purpose was served, except to show the skill of the driver and to secure publicity for the makers of the machine.



A RED CROSS 8 H.P. AMBULANCE OUTFIT.

This unique sidecar is a recent production of Messrs. The Campion Cycle Co., Ltd., Nottingham, and permits the patient to lie flat or sit in a normal position. A semi-circular celluloid screen is fitted, which, with the hood, affords complete protection from the weather. The stretcher can be withdrawn from the rear of the sidecar.

Overseas Co-operative Trading after the War.

An Important Meeting on Overseas Trade.

THE second meeting of motor cycling and accessory manufacturers interested in this proposal was held at the Birmingham Chamber of Commerce on Thursday, 25th April, and was very largely attended.

Mr. Henry Sturmey was in the chair. Mr. Hamilton Wickes, late H.M. Trade Commissioner to India and Canada, and Mr. S. A. Paish, representing the Board of Trade and Foreign Office, attended specially. Mr. Hamilton Wickes explained the conditions obtaining in Canada, and made some most valuable suggestions as to the methods of trading which should be adopted.

Mr. Paish ably commented upon the alternative proposals which those present had under consideration, and promised active Government support in any scheme of a practical nature which might be submitted to that department.

After discussion it was unanimously agreed that a limited company should be formed for the purpose of putting a scheme into operation, and a committee of seven gentlemen representing influential interests in the Motor Accessory Industry was elected as a sub-committee to draft Articles of Association and to submit proposals as to the details of organisation.

The Motor Cycle Trade and the I.A.E.

WE have on several occasions dealt with the efforts being made in various quarters to encourage the scientific point of view in industry. It has occurred to certain members of the motor cycle trade that the Institution of Automobile Engineers, which contains some of the leading experimenters and car designers of the day, is incomplete without representatives from the motor cycle industry. There are, as a matter of fact, in the motor cycle trade at the present time some very capable men—men full of ideas worthy of publicity. At the present time, these men have no inducement to join the Institution of Automobile Engineers, and there is no other means by which they could make their ideas so well known. If they do join and attend the meetings, they hear about nothing but latest developments in car matters. Motor cycles, as such, are practically ignored, and it is only when such a question as fuel is being treated that motor cycle interests are at all an essential feature of any paper. It has been suggested that if the Institution were to open its doors to motor cycle engineers as such it would be to the mutual benefit of the Institution and to the motor cycle trade.

The details of the scheme are as yet not formulated but, so far as it has gone, it is suggested that out of the papers at present read before the Institution of Automobile Engineers, a certain number should be on motor cycle topics, or the number of papers should be increased so as to include motor cycle topics. Also the degree of the Institution should be open to motor cycle engineers.

The scheme has our whole-hearted support, and we wish it the best of success. So far as we can see, nothing but good can possibly come out of it, so long as the necessary support is given unanimously by other members of the trade.

The Flat Twin Criticised.

HAVING read the notes of "A Tilter at Windmills," under the above heading, in *The Motor Cycle* of March 21st, I beg to respond on behalf of the windmills. Together with a senior contributor, whose wit and sound practical judgment I do not hope to rival, I have long advocated the flat twin as a type of engine of which the British manufacturer was safe in making a speciality, and recently I stated something to the effect that torque does not matter in the least within reasonable limits so long as the balance is good. Now, "A Tilter" states that "Torque is far more important than balance," and of all abortions on this flower-strewn earth he advocates the side-by-side twin, balanced as a single. In other words, he suggests sacrificing the simplicity, convenience, and cheapness of the single, to say nothing of its solidity of construction, in order to obtain torque equivalent to that of the flat twin!

In reply one need only ask why, if we are to employ two cylinders, we should place them in such a position that perfect balance is impossible when, by a different arrangement, we can obtain "A Tilter's" much-desired torque and perfect balance into the bargain?

But "A Tilter" gives himself away most horribly in his eagerness to induce one of the windmills to rise at the lure, which I obligingly have done. He suggests fixing one cylinder of the best flat twin going so that it cannot fire, and then seeing of what advantage is one's perfect balance as regards comfort when the engine is robbed of its even torque. Naturally the snatch is worse than with a single, and extreme discomfort is experienced, simply on account of the light flywheel. The more even the firing impulses the lower can be the effective weight of the flywheel, and thus we arrive at the fact that torque is a matter of flywheel weight rather than evenness of firing impulses. A 100 h.p. gas engine, firing once in ten revolutions, can be made to impart so even a torque that it can be used for lighting directly a house installation—simply because one can employ so large a flywheel that the firing impulses are of little consequence.

Let "A Tilter" ride a well-balanced flat twin, ge up to thirty miles an hour, and then cut out one cylinder, and, so long as his silencing is good, he will have no indication of the fact, except by the natural falling off of power.

CHINOOK.

THE MOTOR CYCLE AVIATION SECTION

The enormous importance of the Air Service needs no emphasis: it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouraging of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

600 H.P. Aero Engines?

Not so long ago, aero engines of 200 h.p. were spoken of with bated breath. Nowadays engines of 500 and 600 h.p. are freely discussed.

The Question of Armament.

With aeroplanes increasing in size, and engines getting bigger, why not bigger armament? Is there any outstanding reason why machine-guns of double the present size could not be used?

A Future for the Six-stroke.

While motor cycle manufacturers are busying themselves perfecting the two-stroke engine, aero engine designers are much more interested in the six-stroke principle.

Chief of Many Tribes.

Lt. J. R. Stacey, R.F.C., a Canadian, who recently met with a fatal accident, is said to have been a chief of the Iroquois Indians and of five other North American tribes.

The First Giant Sikorsky.

In 1913, I. I. Sikorsky, who is regarded by many as the father of the large aeroplane, completed his first big plane. The span of its wings was 28 metres with a chord of 3 metres. The length of the body was 19 metres, and in it were arranged comfortable cabins over which was a deck. The body was constructed of three-ply wood, while the landing carriage had eight wheels of the Nieuport type. The power was derived from four 100 h.p. Argus engines driving four tractor propellers. The complete machine weighed about four tons, and flew well with half its engine power. Mr. Sikorsky made some remarkable flights, and beat the world's record for weight lifting by aeroplanes per square foot of wing surface.

The Patriotic League.

Three aeroplanes, subscribed for by Britons resident in Pekin, Rio de Janeiro, and Nicaragua, have been presented by the Patriotic League of Britons Overseas.

AIRMEN MOTOR CYCLISTS

Flt.-Lt. Geoffrey Boyton, of the Ulster Centre of the Motor Cycle Union of Ireland, was one of the first men in Ireland to join up at the outbreak of the war. He sailed for France before the end of September, 1914. After a year's service as a despatch rider, he was granted a commission as an observer in the R.F.C. He was mentioned in despatches in the following June, and during the following month qualified for his "wings." Boyton has been engaged in most of the warmest parts of the line.

In pre-war days, Lt. Boyton was a well-known and enthusiastic motor cyclist, and was the first amateur to finish in the last Tourist Trophy Race.

Flt.-Lt. Geoffrey Boyton, R.A.F.

A Mere Bagatelle.

How many extra thousand pounds of expenditure has the new gradation list of the R.A.F. cost the country per day, we wonder?

Ten Years Ago.

It is interesting to read details of the flights of Mr. Orville Wright which took place ten years ago. One report says that on September 9th, 1908, he made a flight lasting fifty-seven minutes, and a height of 150ft. was reached. Later in the month a height of 300ft. was reached.

A Forty Miles an Hour 'Plane.

Mr. Orville Wright, in 1908, was not satisfied with the speed of his machine, and hoped, by altering his engine sprockets, to get 1,450 revolutions per minute. He thought by so doing he could obtain forty miles per hour.

Pioneer Work.

In 1908 a German Army airship made a record flight lasting thirteen hours, and the Malecot, a combination of aeroplane and balloon, made an ascent at Issy with four passengers and performed evolutions at a height of 450ft.

"The Flypaper."

Newcastle-on-Tyne has a flying paper of its own. Its title is appropriately *The Flypaper*, with "Some funny flights of fancy by flying men" as one sub-title and "A journal expressing the fleeting fancies of flying men" as another.

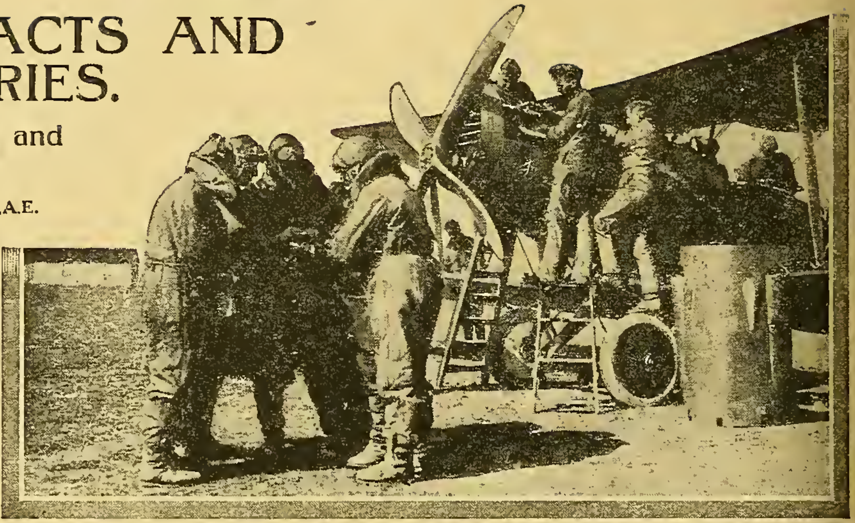
Private Flying in U.S.A.

In the United States a licence must be obtained by any person who contemplates flying near any place designated as a war zone, and as the whole of the United States is designated as a zone of military operations, private flying is impossible without a special permit.

FLYING FACTS AND THEORIES.

CONTROL II.—Tail-sliding and Rolling.

By W. G. ASTON, A.F.Ae.S., A.M.I.A.E.



Pilots discussing their orders while a battle-plane is being prepared.

When a loop is attempted but not accomplished, owing to the aeroplane having insufficient impetus to get on the top, it is forced to carry out a tail-slide, which from many points of view is not a particularly desirable manœuvre, nor is it easy to imagine circumstances in which it could fairly be described as a useful one. The machine is in the position shown in fig. 1, and is forced to drop backwards, inasmuch as the forward thrust of the screw is not able to cope with the weight of the aeroplane. Possibly at a future date, when the horse-power weight ratio has been greatly improved, there will be machines of sufficient power to enable a vertical climb to be carried out, but for the present such a performance is out of the question.

When the machine drops backwards the flat tail plane becomes the leading surface and the main planes become the trailing surfaces; also, since they are now travelling in the reverse direction, the tail has a greater angle of incidence than the main plane, and especially so is this the case if the elevators be kept in the position indicated at No. 1 on the sketch—that is to say, in the position into which the pilot will put them for performing his loop. In these conditions the centre of pressure will be somewhere between the tail and the centre of gravity, so that there will at once be formed a couple tending to right the machine and bring it on to an even keel, as shown in the second position of the sketch. The momentum of the aeroplane will probably carry it further into a position in which the tail is well up, as suggested at position 3 in the same figure. The energy of the tail slide will have now become partly potential, the remainder having been absorbed in resisting the thrust of the screw. The aeroplane is therefore now in a posture suitable for a recovering nose-dive, and this it will do all the more readily if the control-stick is now pushed forward and the elevators set at what will be a positive angle when the machine starts travelling nose first again.

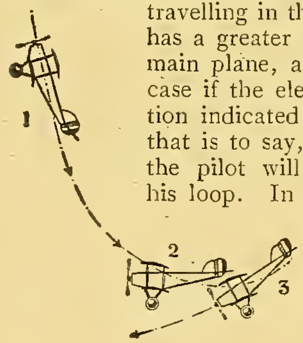


Fig. 1.

The Dangers of a Tail-slide.

There are two principal dangers in connection with the tail-slide. First of all, when the machine stalls going up on its uncompleted loop the pilot may not at once realise the steepness of his altitude. Now the ordinary treatment for a "stall" is to tip the nose of the aeroplane down with the least possible delay. To do this simply means pushing the stick forward and setting the elevators at a positive angle. If the machine has got past being corrected in this manner and now proceeds to tail-slide, it is obvious that the elevators will act as negative planes, as shown in fig. 2, and will consequently defeat, or at least try to defeat, the tendency for the aeroplane to right itself. Furthermore, as they will encourage the machine to dive more vertically they will enhance its diving speed, and, as they are now acting as *leading* planes and not as purely *trailing* planes, a very heavy load will be imposed upon them which may easily be more than they can stand. If, for instance, the elevator control wire breaks, the elevators will simply be doubled up underneath the tail plane, and the whole machine may easily be rendered uncontrollable.

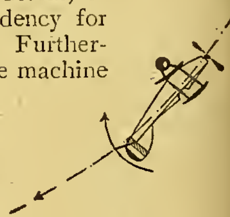


Fig. 2.

The wing flaps, or ailerons, undergo a similar risk of damage, for here again what were originally parts of the trailing edge become parts of the leading edge, with the result that the load and stress upon them are enormously enhanced, and may exceed the safe limit.

It does not always follow that the aeroplane when stalled on the loop tail-slides vertically; on the contrary, the probabilities are that it will be rolled a little one side or the other, and the resulting recovering action will be partly a tail-slide and partly a side-slip. This will, however, only partially relieve the strain on the elevators, and will not, therefore, alter the conditions of the case very materially.

The Roll.

A manœuvre which is comparatively modern, but is none the less highly effective and useful, is the roll, which can either be treated as a manœuvre complete in itself, or as one suitable for combination with others. The roll consists of differentiating the respec-

lying Facts and Theories.—

ive lifts of the wings to such an extent that the aerolane makes a complete revolution on its longitudinal xis. At first sight it might be thought that such a erformance could be carried out with great ease and ithout seriously deflecting the machine from its flight ath, but actually such is far from being the case. s will be shown, the roll is to all intents and purposes loop pulled out sideways, so as to form, as it were, ne complete turn of a corkscrew. That this is so is urther proved by the fact that during the roll the pilot s kept hard in his seat by centrifugal force, showing hat the axis on which the roll is described is not oincident with the axis of the aeroplane.

The reason for this is as follows. During the ottom 180° of the roll the main planes are in such a osition that heir lifting ffect is not as t normally is, in pposition to the orce of gravity, ut is in the same direction as gravity. It is clear, herefore, that if the machine were rolled completely ver when flying level in the ordinary way, it would uring half of the roll lose a very great amount of eight. It is true that an aeroplane, as Pégoud showed, can fly upside down, but to do this it requires to adopt such an attitude that its wings have a positive angle of incidence. Thus, if simply rolled over when flying normally, as suggested in fig. 3, it will not acquire this attitude.

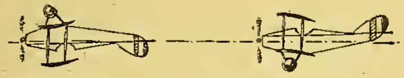


Fig. 3.

When a Roll can be performed.

There is, therefore, only one method by which the machine can be rolled over without serious loss of height, and that consists in carrying out the manœuvre when the aeroplane is "zooming"; in other words, when the aeroplane already has an impetus in an upward direction sufficient to carry it through that phase of the roll when the lift from the wings is negative. Such being the case, it is almost needless to say that the roll is a stunt which cannot be repeated indefinitely, inasmuch as it starts with the machine at full speed and ends with it practically at stalling point. At times I have heard claims put forward for two complete rolls on end, but the most I have ever seen, or that seems to be well authenticated, is one and a half complete rolls, but even that generally entails some little loss of height. The greater the ratio of power to weight the quicker will an aeroplane roll, and the greater will be the angle through which it can roll without losing altitude. A complete roll takes from four to seven seconds.

Aeroplanes by the roadside ready to bring reports of the enemy's positions. (Official.)

STEAMER LANES AND PLANE ROUTES.

EVERYBODY has heard of the "steamer lanes" across the Atlantic, and many landsmen imagine that they represent the most direct route. In actual fact, all the great ocean routes are determined mainly by the set of the currents. Ocean currents rarely exceed 2 m.p.h. in strength, but even this tiny resistance spells a difference of nearly 300 miles on a six-day voyage. When peace opens the door for commercial flight, conventional air routes will undoubtedly come into being, based on similar reasons. Steady currents of wind at 30 m.p.h. are common in some localities, and would be important in a long flight.

THE TRANSATLANTIC FLIGHT.

THE first Transatlantic flight is expected to start from Newfoundland and terminate on the Irish Coast, the distance between the two points being about 1,800 miles. The wind currents across the Atlantic average about 15 m.p.h. Travelling from west to east in normal air conditions, a 100 m.p.h. machine would accomplish the flight in rather less than fifteen hours. Starting in the opposite direction, under similar conditions, the same machine would require about twenty-one hours for the trip.

Thus a flight from America to this side is obviously a simpler proposition than is the return journey.

TAKING TIME BY THE FORELOCK.

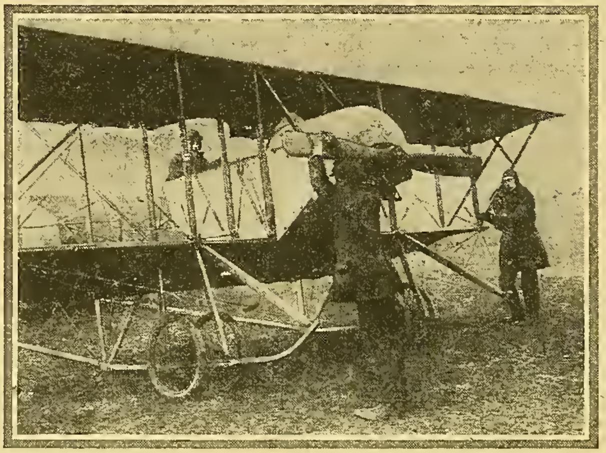
A School at which Youths can Learn to Fly before attaining Military Age.

By **CHARLES L. FREESTON.**

IN the ordinary course of events the embryo pilot does not obtain admission to an officer's cadet wing until he is 17 years and 11 months old, though he may make formal application a month earlier. His first flights, moreover, do not begin until he has been through courses of instruction in military duties, followed by others concerned with the technicalities of engines, rigging, and the theory of flight. Whether he is able to become a flying officer at all, however, depends upon a variety of considerations, and the selection of a man for service does not necessarily imply that he will be trained as a pilot.

Another Way.

There is a way, however, of materially increasing the chances of acceptance, and that is by learning to fly before making application. This means, of course, that tuition must be sought at a civilian flying school. If, while still under the eligible age, a would-be pilot can learn to fly and obtain a Royal Aero Club certificate, he has a very potent credential in his favour when he makes formal application for admission to an officer's cadet wing. The examining Board has no need to consider whether he is of the stuff that pilots are made of, for he has already secured his brevet, and he has merely to satisfy the Board on general grounds.



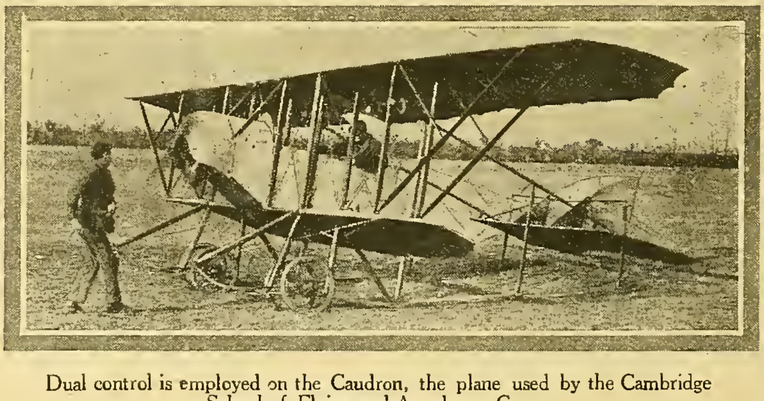
Preparing to start the Caudron tractor, which is fitted with a 50 h.p. Gnôme engine.

But where, it may be asked, is it possible nowadays to learn to fly, save at a naval or military school? Nearly every private flying ground has long since been annexed by the authorities. There are sundry exceptions, none the less, and one is the aerodrome belonging to the Cambridge School of Flying and Aerodrome Co., Ltd., of 30b, St. Andrew's Street, Cambridge. It is situate at Hardwick, a pleasant village a few miles out from Cambridge, where good living accommodation is to be found at a reasonable price.

A Suitable School.

From all that I saw there on the occasion of a recent visit, I may testify that the place is eminently suitable for the purpose, and that the school is conducted on sound lines. I was informed that for the most part the pupils have been young aspirants, patriotically eager to become Service pilots at the earliest possible date, and to present themselves ready armed with a certificate when they seek admission to a cadet wing. And let it be said, at once, that a considerable portion of the sum they have paid in tuition fees is refunded by the Government if they are successful in their application.

The aerodrome itself is about eighty acres in extent, entirely free from obstructions, and is surrounded, moreover, by a vast area of flat ground. Under the skilful and careful tuition afforded by the school instructors, the prospect of landing outside the aerodrome has rarely to be considered, but it is at all events consoling to know that the adjoining territory is not of a rugged or otherwise unsuitable kind.



Dual control is employed on the Caudron, the plane used by the Cambridge School of Flying and Aerodrome Co.

Instruction is given on Caudron tractor biplanes, with 50 h.p. Gnôme engines—a very suitable type for the purpose. Dual control, of course, is employed. As may be seen from the illustrations, the machines have double tail-booms and a *naçelle* body, and for school purposes this confers the great advantage that, in the case of a bad landing, the damage done can be repaired by the substitution of new tail-booms, whereas if the ordinary tractor fuselage were used structural damage would be more serio

A Three Months' Course.

The chief instructor and aerodrc manager was, until a few days ago, A. Assheton Salton, but he has tal up the testing of aeroplanes, and succeeded by Mr. L. Ry Knowles, a Service pilot of la experience, who is assisted Mr. B. J. E. Currey, a Hendon pilot. The system instruction is sound thorough, and accidents h been practically unknown dur the two years that the Ha- wick school has been in ex- ence.

Three months' tuition is gi if necessary, but as a gen rule a pupil obtains his Rc Aero Club certificate within to eight weeks. The govern factors are not merely his ind- dual aptitude, but the state the weather and the number days on which instruction possible.

The tests for a R.Ae.C. ce- ficate comprise two dista flights of at least tweny- furlongs, in the form of figu of eight, the landing to made each time within a gi radius of a marked point, and als *vol plané* from 100 metres (328ft.)

Mechanical Training.

In addition to learning to pilot aeroplane, the pupils are given ev opportunity of gaining a practical kn- ledge of the internal combustion eng the erection and repair of aeroplanes, general machine s practice. If interes in questions of the or design, they make arrangements private coaching at Cambridge offices of company under guidance of Mr. H S. Cuthbertson, business manager, was formerly the c designer and mathe tician of a Midl aircraft manufactu firm.

The ranks of m cyclists, it scarcely ne to be added, have duced a steady str of pilots of the class in the past; in f no section of the community has more useful in this important sphere. the present juncture new recruits more than ever needed, and the yc of to-day could have no worthier a tion than to seek to join the Royal Force, in which the opportunities individual distinction are greater tha any other arm of the Services.

A.I.D LADY DESPATCH RIDERS.

Work of the Women's Legion Recruits.

THE lady motor cyclists who are doing despatch riding for the Aeronautical Inspection Department are in rather a peculiar position. It might be naturally supposed that this Department, being directly under the Air Ministry, would employ R.F.C. drivers, but, in actual fact, the lady motor cyclists are recruited through the Women's Legion into the A.S.C., M.T., and are then attached to the A.I.D.

Their duties are to take officers and men to the various works for inspection purposes. Their journeys are mostly in London or, at any rate, in the London area, and they usually amount to some ten or twelve miles in length, while in the course of their duties they average from 150 to 200 miles per week. They are expected to do their own roadside repairs, change tyres, and clean their machines, but the more serious mechanical work is undertaken by six civilian mechanics under the charge of an R.A.F. corporal, who has served in France for over two years.

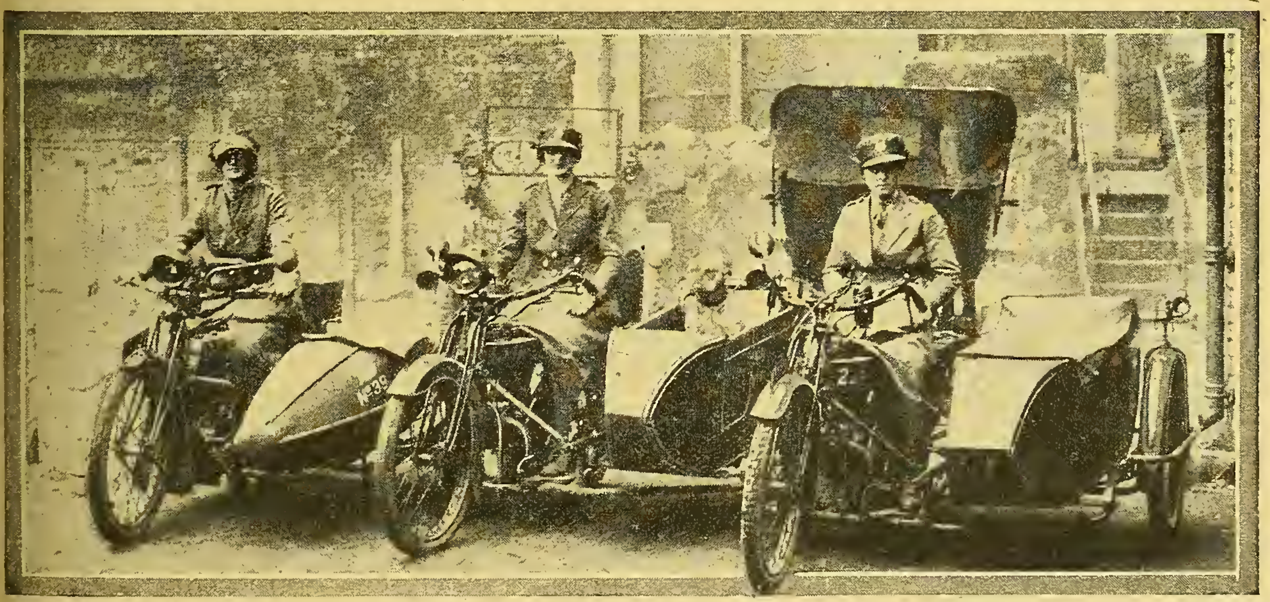
The officer in charge explained to us that the girls are splendid workers, and they very rarely complain. They have to parade at 8.45 a.m., and roll call is taken by the head driver. They are supposed to stop work at 6 p.m., but this very largely depends upon the exigencies of their duties. They have to carry on in all weathers, winter and summer, and, despite this fact, their attendance is excellent.

There are very few accidents. One, as a matter of fact, collided with a taxicab the other week and buckled the back wheel, but such incidents are few and far between.

Starting Big Twins.

We questioned several of the ladies regarding the starting of their engines, and, notwithstanding the fact that many of them are big twins, they experience very little difficulty in this respect. One lady whom we questioned had driven a car before joining the A.I.D. detachment, but had had no motor cycle experience, while another had never driven a motor cycle before joining up, had received instruction at the hands of the corporal, and after a week's tuition drove quite well enough to take people round on inspection work.

The time that the girls are not actually employed in despatch riding they usually spend in their workshop, watching how repairs are done and learning all they can about motor cycles. The machines with which they are provided are mostly 5-6 h.p. Clynos, of the famous W.D. pattern, while there is also a Triumph, which is fitted with a semi-racing sidecar body, and two W.D. pattern 4 h.p. Douglases.



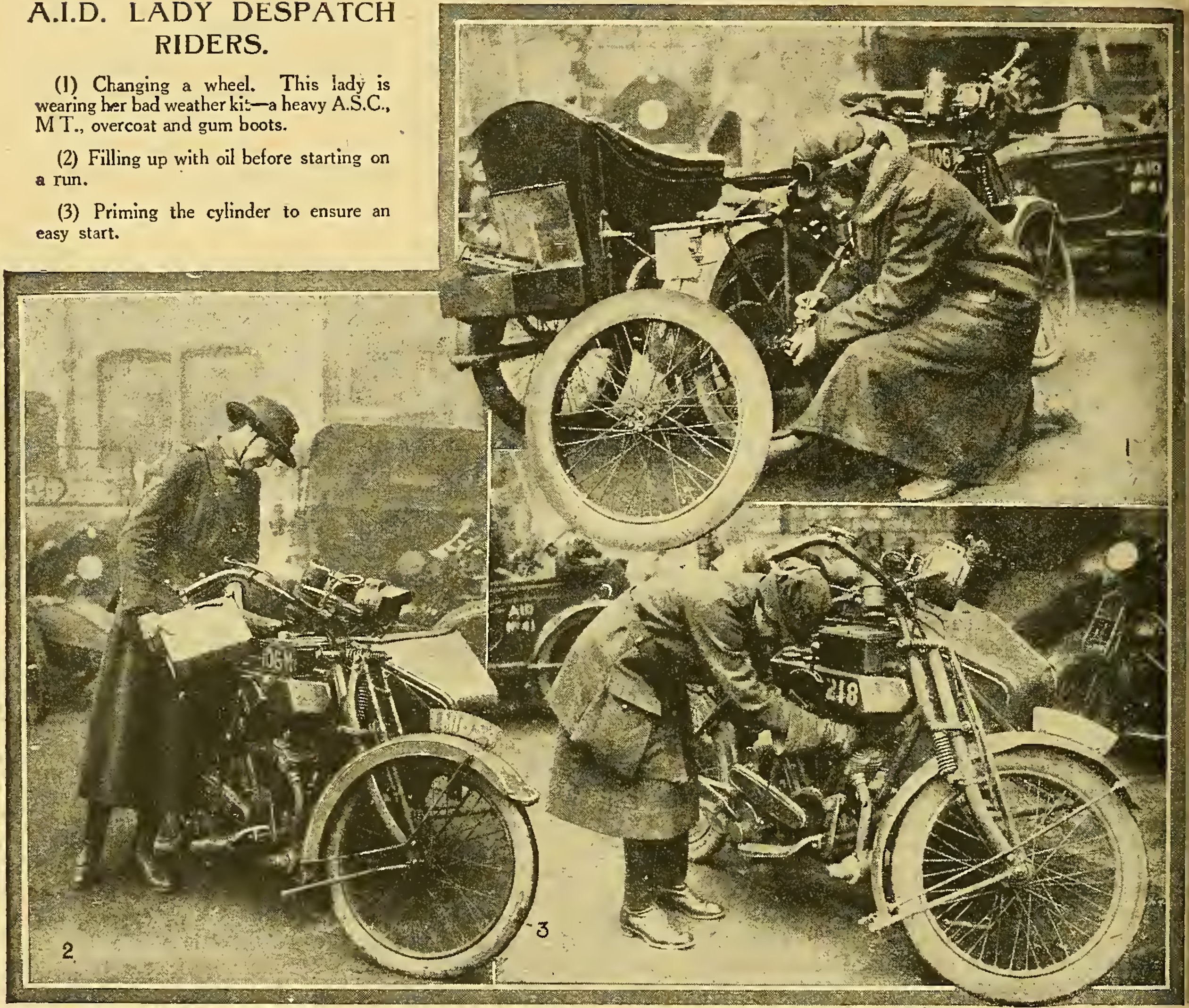
Three A.I.D. lady despatch riders. Two are mounted on 4 h.p. Douglases and one on a Triumph.

A.I.D. LADY DESPATCH RIDERS.

(1) Changing a wheel. This lady is wearing her bad weather kit—a heavy A.S.C., M.T., overcoat and gum boots.

(2) Filling up with oil before starting on a run.

(3) Priming the cylinder to ensure an easy start.



Christchurch Motor Cycle Carnival.

Motor Cycle compared with Horse Racing as a Spectacular Sport.

A CORRESPONDENT writes as follows in sending us an account of an event recently held in New Zealand. Alan Woodman, who figured prominently, is, of course, the rider who lost a leg while practising for the 1910 T.T.

“The carnival—held in aid of the Red Cross—proved the most successful event of its kind ever held in Australasia, and far ahead of any similar event I have ever seen. It was held on Stockburn Course, a fairly heavy grass track exactly a mile in circumference. Owing to heavy rains the meeting was postponed from February 16th to February 23rd, and was then held in perfect weather. A record crowd for the course was present, and the excitement was tremendous and continuous. It certainly showed what the possibilities were of motor cycle racing after the war, and left no doubt in my mind that it is destined to become, with the provision of proper tracks, as great a sport as horse racing. The sight of nine or ten motor cycles tearing round the track neck and neck at over sixty miles an hour made horse racing seen quite tame, and this was the general opinion of thos present.

Victories of an English Machine.

“B.S.A. riders had a great day out. Woodma started off by winning the Light Weight Handica from scratch, with Karton, also on a B.S.A., second The same riders were first and second again in th Middle Weight Championship. In the big ope handicap, Bonnington rode a B.S.A., for the firs time, and just won from Woodman, who rode anothe great race on his B.S.A. In the Relay Race Woodman won the event for his team, beating his rival b over 600 yards. To cap all, two men were put o B.S.A.'s in the final Consolation Race, and score first and third. It was a great series of wins agains all the best riders of New Zealand, and the victories o Woodman, who has only one leg, and who has n rival as a daring and spectacular rider, were mos popular.”

Letters to the Editor

The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

THE RULE OF THE ROAD AND OF THE FOOTPATH.

Sir,—May I make a suggestion concerning your recent remarks on the rule of the road? In towns and places with pavements, pedestrians are, or should be, more or less on the look out for traffic. On country roads the fact that vehicles keep to the left and pedestrians keep to the right is the greatest safeguard. G. N. PHILLIPS.

SIDECAR SPRINGING.

Sir,—I was greatly interested in the remarks in your Overseas Section on sidecar springing and would like to endorse every word of them.

I had a 1915 Matchless combination with sprung sidecar wheel, and never fully appreciated its worth until I started riding my present combination, which is an almost similar model minus the sidecar sprung wheel. Unfortunately, Messrs. Collier have stopped fitting the sprung wheel, the reason given being that it interferes with the steering.

I suppose I must give Messrs. Collier credit for more experience than I have had, but I can only say that I never noticed this defect in 7,000 miles riding with all sorts of loads and road conditions, and I should never have sold the 1915 mount had I known that I should not be able to get another spring wheel model. S. J. LAYGELL.

FRENCH ROADS.

Sir,—The fact that writers on motor matters usually disparage the French *pavé* roads has always been to me a source of mild astonishment. I refer, of course, to the roads well behind the line which are not subject to shell fire, but which have to carry an extraordinarily heavy traffic of transport lorries, etc. *Pavé* appears to wear remarkably well, and wears gradually, not going into pot-holes as do other roads. It is almost dustless, and, although in wet weather a certain caution has to be exercised when cornering at speed, it is not much worse than are the roads at home under similar conditions. Personally, I should be pleased to see our own road authorities laying down *pavé* roads at home. It might be interesting to hear your readers' opinions on this point. The roads in the shell zone are naturally bad, shell holes usually being filled in with a few sand bags covered with gravel. The most noticeable effect of the bad roads on a motor cycle is the alarming regularity with which one's back tyre bursts, especially if one's riding weight is fifteen stone. Butt-ended tubes are the worst offenders, and the way in which a new butt-ender will blow out at the butt after a few miles of riding is positively heart breaking.

By the way, I wonder if any of your readers have managed to make a good repair of a butt-ender. I have tried many times with a deplorable lack of success.

One often hears the remark: "Triumph? Yes, a good machine spoilt by its spring forks." Possibly the Triumph forks are a thought less comfortable than, say, the Brampton Biflex, but for control and stability in grease and at speed I have never found their equal.

Apropos of nothing, if I could catch the designer of the kick starter of a certain W.D. 3½ h.p. I would shoot him on sight; a more deplorably inefficient article I have never seen. Although an excellent machine in other respects, I would most positively affirm that its kick starter had been designed by the office boy. After the war, when petrol is obtainable again at a purely nominal charge, and I use my motor bicycle to carry me and my rod about the country in search of fresh waters to fish, Allah preserve me from the W.D. model. I shall certainly ride either a British flat twin or a Henderson "4." An unsprung single is, without a doubt, a vastly uncomfortable mount.

London. TAMPION.

SLEEVE ENGINE FOR MOTOR CYCLES.

Sir,—I am afraid all the claims made for sleeve valve engines in the car world are not borne out by facts. Anyone who has had hard practical experience with them realises this, especially as regards silence. I have seen very few out here that do not develop heartrending knocks after a few weeks' running. They do give good service as a whole, but I consider them capable of many improvements before they are quite perfect, even for a car, much less as fit for an air-cooled engine on a motor cycle.

B.E.F. MOTOR CYCLIST.

CRITICISM!

Sir,—I noted with some disgust that a contemporary has made a very feeble effort at wit, pointed, I presume, at one of the dainty little headings used in your journal.

I have often admired this heading, and beg to say that it was quite in season. Had the writer been more of a florist, or *his florist* more of a motor cyclist, their combined efforts would have held more truth.

I might suggest that the writer does not live in the only spot on the map where your paper is sold, and if he cares to visit Sheffield I can show him daffodils still in bud; in fact, a local well-known daffodil garden—where hundreds of pounds have been collected for charities—has not yet been opened for the annual show.

What about the gardens further north? J.G.

[Many thanks.—Ed.]

TWIST GRIP CONTROLS.

Sir,—May I say a few words about twist-grip control? On my Excelsior the controls are composed of substantial metal rods in full view, and, there being no wires to break, no attention, beyond a grease over, need be paid to them.

It is simplicity itself, and, personally, I am resolved not to revert to the old "tap-twiddling" operation. On the Excelsior, where the left grip controls the clutch, it is unnecessary to remove the hands from the bars for long distances, as I surmount main road hills with three up, and, of course, there is no need to refer to the advantages of this in traffic.

I also have heard it suggested that the grip was liable to turn under vibration of the bars. This is not so, as there is sufficient stiffness to resist this tendency.

There is another fallacy, to the effect that, as one cannot see the position of the levers, so to speak, it is impossible to tell how much gas one is giving. In this case, motorists who go by the *feel* of their engine can readily tell when changing from pilot to main jet and onward by the more powerful beat of the engine.

Again, American twist-grip controlled carburetters give that quiet, economical "tick-over" instead of the nerve racking roar of some British machines when in free engine, there being no need of careful tuning to obtain that much-sought-after asset.

Then there is the no-trouble mechanical pump lubrication—but "nuf sed"; this ground has been gone over so many times already. AMERICAN EX.

Watford.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—I notice in *The Motor Cycle* of April 11th and 18th that a few A.M.'s in the R.A.F. do not seem to like trade tests. No doubt they are not being treated fairly compared with the M.T.'s, but the whole war is unfair. An A.M.'s job looks all right compared with the infantryman's, though, you will admit, there must be thousands of motor men in the infantry who will come out whole if they are lucky.

Anyhow, I would like to see every man go through a good trade test to get into a unit such as the R.A.F., and go through a stiffer one to become a 1st A.M., and so on. Therefore I fail to see where the "cruel injustice" or the "grave insult to the motoring fraternity" comes in. One has only to look in the "Questions and Replies" column to see that a man does not become a mechanic just because he has owned a "grid" for some time. Anyhow, if a man knows anything at all about an internal combustion engine, he can pass the required "test." So why worry? A.F.C.

Canterbury.

Sir,—May we ask the favour of a few lines to reply to "A Few Non-technical Privates, R.A.F.," in your issue of April 18th? We air mechanics wish to contradict their statement *re* doing all their own repairs to their motor cycles.

May we point out that no driver of either a motor cycle or a car is under any circumstances allowed to do any "repairs" or "adjustments" on his machine whatever, as we, the M.T. fitters, are at all times responsible for the mechanical parts of all machines being in a serviceable condition? A FEW M.T. FITTERS, R.A.F.

Sir,—All motor cyclists of the R.F.C.—particularly Overseas men—feel very dissatisfied at being remustered under the new Air Force as non-technical. We wonder what our officer in command of transport would think or say were we really non-technical.

Half a dozen of us are stationed in this district, and although belonging to various units, each unit with its own C.O., we all possess the "prop" of the First Class Air Mechanic. Why have we received this distinction if it is not that we have proved efficient in our duties? It is surely agreed that to be a good motor cyclist one must have technical knowledge of one's 'bus. We were required to pass a test on enlisting in the corps. What for? Our fortunate brothers, the M.T. drivers, are themselves at a loss as to why the distinction is made.

After reading so frequently in yonr popular journal and in the daily papers of the grand, hard work done by D.R.'s (both R.E. and R.F.C.), the attitude taken by the "powers that be" towards the motor cyclist is distinctly unflattering and discouraging. SIX FIRST A.M.'S.

Newcastle.

Sir,—I am another motor cyclist who thinks the cyclists in the R.A.F. are being treated very unfairly, not so much in the title—viz., private—as in the rate of pay. The cyclist's job out here is by far the most treacherous work in the R.A.F., except, of course, the pilot's, and I consider our position should be put before those in authority, with a view to having it looked into and revised. This, I might say, is the opinion of all the motor cyclists out here, and also of one who wears

B.E.F. THREE BLUE 'UNS.

A PLEA FOR HIGHER GEARS.

Sir,—I support "Four Crazy" in his appeal for higher gears. A motor cycle with a 5 to 1 top and change-speed gear for solo work necessitates unnecessary engine revolutions to get over the ground, though for war service it is undoubtedly ideal. An article some years ago described an official run on a $3\frac{1}{2}$ h.p. Rover with Armstrong hub gear, "and the $3\frac{1}{2}$ to 1 gear was taken quite smoothly by the heavy flywheels." My 1913 Rover has a top gear of $3\frac{1}{2}$ to 1, middle $4\frac{3}{4}$ to 1, bottom gear about 7. If the bottom gear were 12 or 15 to 1, the combination of gears would be my ideal. The bottom gear—only wanted in an emergency—should be very low. When running on top, the smooth, slow pulling is not so tiring as a machine that is revving its heart out to maintain 30 m.p.h.

I should certainly like a run on a $2\frac{3}{4}$ h.p. single that can do fifty on the road. I should most likely leave it behind at 35-40—speedometers vary so much. Anyway, to cover a distance quickly without any fuss a high gear is a great help. An ideal machine would be a four-stroke 90°, four-cylinder, outside flywheel, which would pull a high gear. I have no interest in the Rover except as a satisfied user.

Leiston. V.A.B.

A BAFFLING EXPERIENCE.

Sir,—In reply to Mr. Chapman's letter in your issue of April 18th, with reference to his breakdown. Some time ago I had a similar trouble with my machine fitted with J.A.P. engine and E.I.C. magneto.

Having done the same as Mr. Chapman did without success, I removed the magneto cover, and there I found my trouble.

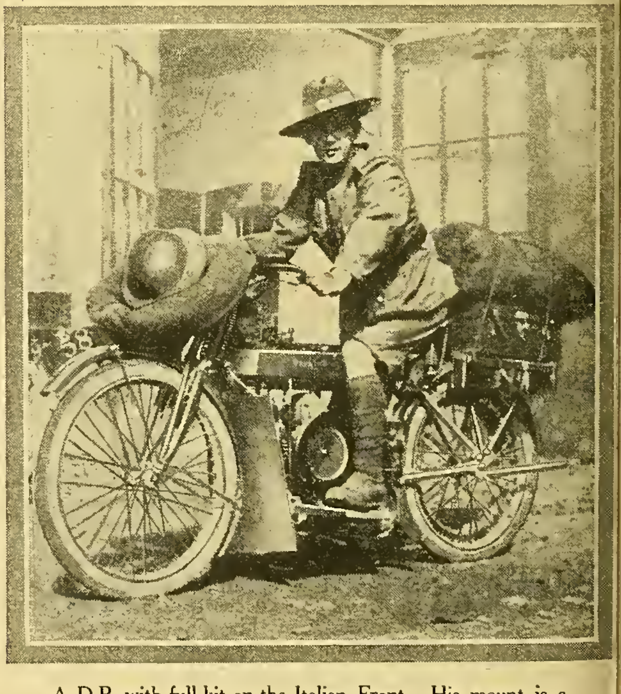
It was a damp day, and the dampness had made the fibre on the make and break swell. The result of this was that the rocker arm was working very stiffly, and at times jamming altogether, so that, instead of closing the points with a click, it closed them slowly, with the result that the spark occurred either extremely late or early.

Thus when I removed the plug it was sparking perfectly but not at anything like the right time, although the timing of the magneto was quite all right.

Therefore I should suggest that this was Mr. Chapman's trouble, and when the machine was left in a dry garage for a few hours the fibre dried, so that the rocker arm was performing its function correctly with the spark occurring at the right time. I hope this will prove of service to Mr. Chapman should the trouble occur again. L. MOON.

Sir,—I had a similar experience to Mr. F. W. Chapman as stated in your issue of April 18th. Recently, when preparing a $3\frac{1}{2}$ h.p. 1914 three-speed hub Triumph for the road, I got all in good order, but no explosions on trying kick start. This was a surprise, as I had carefully cleaned all parts thoroughly. I then took off the magneto cover; make and break seemed perfect. Tried again; no response. Tried wire; good shock. Tried testing spark at plug points; also good. Inserted plug again; still no response. Then I took off the outer mechanism of magneto, and found on the inner edge of one platinum point a small bit of fluff. Here was the cause of my trouble. I carefully cleaned all moving parts, reassembed the magneto, and got the engine firing first kick.

I may say that I have been a regular reader of *The Motor Cycle* since March, 1914, and have found it of great help in many tricky problems. T.D.



A D.R. with full kit on the Italian Front. His mount is a W.D. Douglas.

AN EXCELLENT SUGGESTION.

Sir,—Your paper has excelled itself recently. The articles on the "Outside Flywheel" and the "Case for the Long Stroke" and numerous others are worth reading again and again. Now I have never seen you deal with the contents of the timing case, except in isolated cases, and I should like to see the matter dealt with in your pages week by week. The dispositions of cams, rollers, and tappets make the timing mechanism noisy or quiet: let us observe how the problem is attacked by various makers.

I have taken the "Blue 'Un" since 1907, and still have it sent to me regularly. G. H. HAMILTON, Lt.

Italian E.F.

[Curiously enough, it happens that such an article is already in course of preparation.—Ed.]

AN UNEXPLAINED SPILL.

Sir,—It is greatly interesting to follow the various debates in your most valuable paper, and I may say that I have gained much information by them.

As a solo rider of moderate horse-power I have very little to relate, but an incident I witnessed recently would, I think, be of some value to those intending to be "sidecar" drivers.

While walking along the Southsea Promenade, a James and sidecar (fully laden) slowly passed by, and, as there was nothing unusual, no notice was taken of it. Then I heard a sudden rush of the engine, and, on turning round—my dismay can be imagined—there was the machine and sidecar absolutely turned turtle, with the engine racing and smoking. I rushed over and stopped the engine. The sidecar passenger was just extricating himself, and was rather badly bruised; the driver was also badly shaken. The most fortunate part was that when everything was straightened out, the only thing damaged was the sidecar lamp. This speaks highly for the 4¼ h.p. James.

It is rather a puzzler how this could have occurred, as the road was in very decent condition and no traffic or anything about at the time. I never realised that such an accident could occur with a sidecar, and I should be greatly obliged if any of your readers could explain the reason. D.F.

Portsmouth.

THE BEST GEAR FOR STARTING.

Sir,—I have just received my copy of the "Blue 'Un" for January 24th (January 3rd, 10th, and 17th miscarried), and I hope it is not too late to say how pleased I am to note the stand you have made regarding "Goods made in Germany." [This correspondence is closed, but we print the following letter as it comes from a distance.—Ed.] Hearty congratulations and strong blows to thine arm. How Mr. Ives and his so-called band of sportsmen can have the effrontery to make such statements in face of the devilish conduct of the enemy day by day I cannot understand. I only wish I could have the pleasure of conducting Mr. Ives over the battle area of "insignificant" Palestine. I could almost guarantee to change his tune before the close of the first day. If he and his followers have discontinued their patronage of the "Blue 'Un" (which I very much doubt), you may rest assured you are well rid of such pro-German piffle.

Now I shall be glad if you will permit me to air my humble opinion regarding your reply to "C.R.S." under "Questions and Replies." He had apparently been taught to start in low gear, while the garage proprietor and yourself advise the top gear. But what about the second gear as a happy medium? As the second gear is not mentioned by either of you, I should be very glad to know why, as there appears to be a reason for it. I have a 7-9 h.p. 1916 Indian, and have always started in the second gear, both with and without sidecar, unless I had more than one passenger, which is the only time I find it necessary to resort to low gear. This is the advice I had from Messrs. Godfrey, and it certainly appeals to the good behaviour of the engine, etc. My reason is this. If starting without the sidecar, it is usual, I think, for most riders to push off instead of using the kick start, in which case, unless the machine be pushed at a good running pace, a knocking must naturally be the result if the top gear is used. Moreover, should the throttle be partly open when the engine fires, it is very doubtful, unless one is semi-acrobatic, whether one will land decently in the saddle, or see the machine go down the road riderless. This danger is reduced to a minimum when the second gear is used: I am not a timid rider by any means, but I have always found the second gear lively enough, while the top is too high if one has any feeling for the engine. Even with the sidecar attached, I think the second gear is quite low enough to get away comfortably with the ordinary load, the low gear being used for a heavy load or a stiff hill.

I should very much like to hear the opinions of other riders on these points, as I can only remember one or two isolated cases where the average rider starts away on top.

Cairo. STANLEY F. KAY.

THE CASE FOR THE LONG STROKE.

Sir,—May I take the liberty of criticising some statements made in an article by Alex. Lindsay, M.B., in your issue of March 28th last? I hope your contributor will take these remarks in the spirit in which they are addressed. No advancement in mechanical science can ever be made without the ventilation of the arguments of both sides.

The author of the article in question states that the "longer induction effort of a long stroke engine results in a very easy start." This, to my mind, is fallacious. The volume of gas drawn into the cylinder is in no way affected by the proportion which the bore bears to the stroke. If a long stroke engine and a short stroke engine both possess the same cubic capacity, and if the design of the induction pipe and inlet port is equally good, then the amount of gas induced is the same in each case. This is a fundamental fact, and no statement to the contrary can alter it. A 79 × 100 T.T. Norton, an 85 × 88 T.T. Rudge, an 85 × 88 T.T. Triumph, and a 90 bore twin J.A.P.-engined machine which I used in 1914 all started with equal ease.

Dr. Lindsay indicates throughout his article that the long stroke engine is capable of pulling a higher gear under average circumstances than the ordinary square engine. This is a debatable point. A 3½ h.p. T.T. square-engined Rudge gave me entire satisfaction on any ordinary main roads with a fixed gear of 3½ to 1. A 3½ h.p. Premier used a gear of 3¾ to 1, and a 3½ h.p. T.T. Triumph travelled from Manchester to Gloucester and back using a gear of 3⅜ to 1, climbing all hills with ease. This latter may have been a freak performance, but it was actually accomplished. No long stroke engine of my acquaintance has ever bettered these ratios.

It is also stated that when running on benzole or other slow burning fuel the long stroke engine utilises the slower rate of flame propagation to the full. If both types of engine are running at the same speed, then in each case the piston is exposed to the push of the explosion for exactly the same length of time. The length of stroke has no bearing on this question. It is also claimed for the long stroke engine that the smaller diameter piston can be made much lighter than it can in the square engine. This is undoubtedly true, but it is counterbalanced by the fact that the piston has to be accelerated from rest to a much higher speed at the centre of its stroke than has the piston of the square engine, and in the same time.

The petrol consumption of any machine is largely a personal equation. The Rudge mentioned averaged 110 m.p.g. over 12,000 miles. Of five T.T. Nortons of my acquaintance four failed to reach 100 m.p.g. over long mileages, while the fifth averaged 104 m.p.g. A square engined Ivy-Precision at the same period averaged 108 m.p.g., and a 3½ h.p. Triumph 102 m.p.g. over long distances. Thus, the long stroke engine can claim no advantage in this respect.

When it comes to speed, then I bow, at the present time, to the splendid records gained by long stroke engines. But the Norton's 83 m.p.h. has been almost equalled by the short stroke A.B.C., and the difference between the two speeds is too small to quibble about. In the Senior T.T. race of 1913 a square engined Rudge was only beaten by five seconds, and that by a twin-cylinder two-stroke. In the Senior T.T. race of 1914 a square-engined Rudge defeated all its opponents with ease, including many long-stroke engines. This performance, over a gruelling course of over 200 miles, is infinitely better than covering a flying kilometre on a cement track with a freak machine and every artificial aid to speed that can be procured. N. S. BOWES.

B.E.F.

SUMMARY OF CORRESPONDENCE.

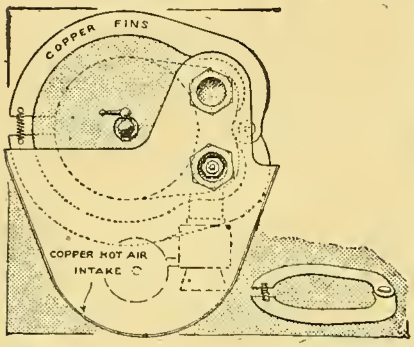
A BAFFLING EXPERIENCE.

In a letter on this subject the words "fibre brush" occur. "Brush" should, of course, read "bush."

Experiences with a 4 h.p. Wolf in India.

The Overheating Difficulty and its Treatment.

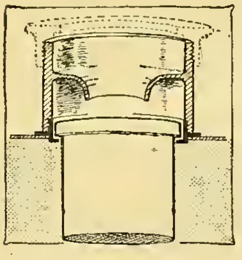
OVERHEATING of air-cooled engines often occurs in countries of temperate climate, and one can fully appreciate the difficulties motor cyclists have to contend with in such a country as India. From time to time we receive details of improvised methods of combating the overheating evil, and the following account received from Mr. Robert Brooks, of Howrah, Bengal, shows how successful his experiments were in this direction.



Plan view of combustion head, showing how the hot air intake or scoop is fitted on to the cylinders. (Inset) One of the hinged fins and hooked spring.

He says: "Some months ago I sent you a report of road tests of my machine—a 4 h.p. 1914 Wolf motor cycle with sidecar and passenger. I then obtained eighty-three miles to the gallon.

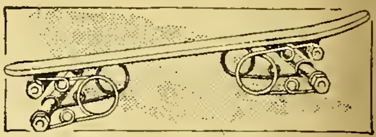
"I have since added radiating fins of copper to the cylinder, hinged between the valves, and clamped by hooked springs on the opposite side, and over this have fitted a hot air scoop held by valve caps on top and feed pipe connections below. This also acts as heating jacket round carburetter and float chamber. I recently filled up with one gallon of American kerosene called 'Tidewater-oil' for a solo test. The circuit I followed was about twenty-one miles in extent, one-third of this being in the suburbs of Calcutta and under the fifteen miles speed limit. After a five hours and forty minutes non-stop run, mileage then at one hundred and twenty, I was feeling dusty, tired, and hungry. On sounding the tank I found still a quantity of oil left; I then closed down for the day. Two days later I got twenty miles more from the same, making one hundred and forty miles in all. Feed pipe joints were not in the best of order: every connection showed a little leakage. The machine has not had proper attention; crank case and hubs have never been opened, and I am still using the original sparking plug, piston rings, valves and springs. The engine has been decarbonised about each fifteen hundred miles, and that is about all the pampering it has had. The carburetter is a Senspray, which I consider splendid for straight-away work.



The extension to filler cap, which effectively prevented waste of petrol.

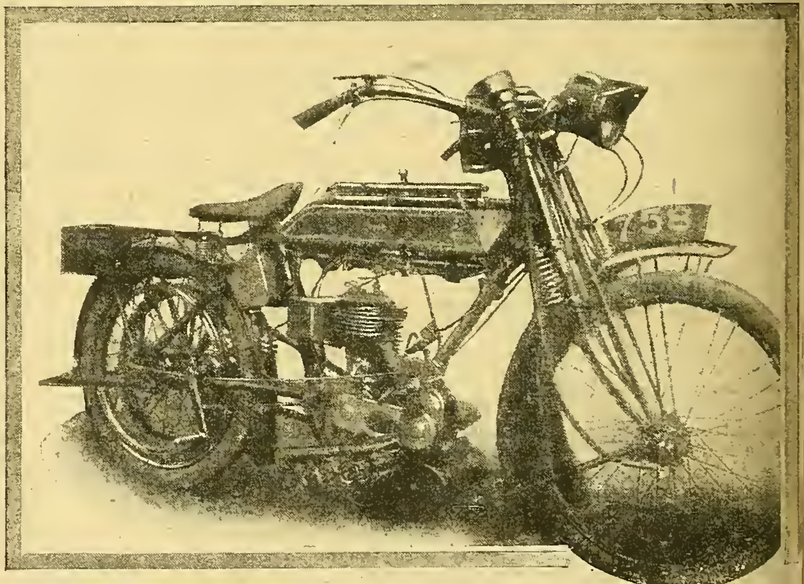
Detail Improvements.

"You will perhaps see by the photographs that I have made several additions. I have fitted a silencer chamber about three times the original size, and a one-inch tail pipe. A cut-out is fitted to act as an alarm while running through native bazaars, cattle, goats, etc., when sharp note is necessary to draw thei attention. Loop springs are fitted unde footboards, four under each, drip extensions to mudguards, and saddle pilla clip turned over reduces height of saddl one and a half inches. The petrol and oi filler caps were allowing a lot of waste so I carried them up one and a hal inches and followed the old idea of th unspillable ink pot, and now there is n loss from that quarter. Everything i still in splendid working order. I hav no interest in any of the parties named except as a satisfied user.



The springing arrangement of the footboards.

"As for my next machine—not that th change will be early—it will certainly b all-British."



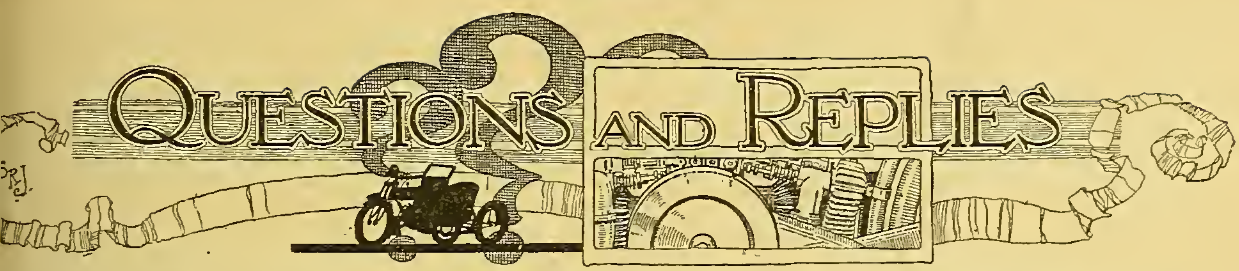
The 4 h.p. J.A.P.-engined Wolf, to which several refinements have been fitted, including spring footboards and special cooling arrangements.

* * *

COAL GAS AND MOTORISTS.

WE have more than once suggested that there is more in coal gas of interest to motorists than most of the latter are aware. Everyone knows, of course, that benzole depends for its existence in this country on the coal gas industry; but there is more than this in the question, as was recently revealed in the address given to the British Commercial Gas Association by the retiring president, Sir Robert Hadfield, F.R.S. According to a German scholar, the coal resources of this country will last for some 500 years, as compared with 1,000 years for those of Germany, and 600 for those of France. The remedy for the present extravagant method of using coal is its use not as a fuel directly but as a gas, and this use on a more extended scale will result, of course, in a great increase in the production of by-products, one of which is an excellent motor fuel.

Sir Robert then dealt with other possible sources of fuel for motor vehicles. And it is of real interest to see that man of such authority agrees with that the most likely solution of fut difficulties lies in the adoption of alcol as a motor fuel. In conjunction w Prof. Burstall, another eminent authori Sir Robert thinks that the cactus pl of Australia contains the most promisi germs of a final solution, because plant has the requisite chemical featur and, moreover, is exceedingly luxuri in growth.



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle,"
Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents
urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal
estions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Belt Line Trouble.

I am the possessor and driver of a 1912 free engine Triumph. Last July, whilst on a journey of twenty miles, the belt from the pulley to the belt drum ran very
egularly, and twisted and turned,
ipping and spoiling the belt. I
ight a new one, and ran it all
ht till the second week in April,
en it did similar antics. I took the
chine to a garage, and closed the
ley so that the belt was about
eequarters of the way up the
ley; it is just level in the belt
im. If I get up to 20 m.p.h. the
ip of the belt throws it off the
t drum. The pulley and belt drum
pear to be in a line, and I am at a
s to know what to do.—W.J.B.

trouble cannot lie in the belt itself,
must be a fault of alignment of the
ys, even although you think these
correct. Possibly they are correct
the machine is stationary, but
may be play in the belt rim, or the
e itself may be loose in the frame,
at when the strain on the belt is
ased the belt-line is upset. If this
e trouble, it could quite easily be
mittent.

Removing a Pulley.

I am overhauling my 1914 Zenith-Jap (1913 pattern). I want to remove the flange of the Gradua pulley from the crankshaft; will you kindly suggest
best method? I have tried
dging it all round and also levering
but it seems to have got very tight.
ave removed the pulleys from other
kes of machines, but have not ex-
ienced such a tight fit. As it is
own machine, of course I am
ious not to damage the crank case.
hough I am a motor cycle artificer,
m always on the look-out for better
thods of procedure.—R.C.C.

best plan will be for you to use a
r pulley drawer, which can be
ned from most accessory dealers,
as Markt and Co., Ltd., 98-100,
enwell Road, London, E.C.1;
n Bros., Ltd., 15, Newman Street,
on, W.1. etc. Tapping sharply on
op of the flange sometimes loosens
fficiently for it to be withdrawn.
this is not a good method, and if
have found that wedges fail and
cannot obtain the use of a pulley
er, we should recommend you to
the crank case to Messrs. Zenith
rs, Ltd., Hampton Court, Middle-
who will remove the flange and
n it to you the same day.

Hub Gear Maker's Address.

Would you be kind enough to give me the address, if possible, of the Armstrong hub gear manufacturers?—H.T.

The Armstrong Three-speed Gear Co. is not now in existence, but a letter addressed to Messrs. Sturmey-Archer Gears, Ltd., Beeston, Nottingham, would secure an answer to any enquiries you may wish to make regarding the Armstrong gear.

Please give your order for 'The Motor Cycle' TO-DAY.

This is necessary, both in the interests of national economy and to ensure getting copies regularly.

¶ It is impossible to lay too much stress on the importance of economy in the consumption of paper. Supplies are restricted to such a degree that only by conserving the stocks can publishers continue to meet the requirements of regular readers. The shortage is now too serious for the usual provision to be made for chance sales; the risk of copies remaining unsold must be eliminated.

¶ Every unsold copy represents waste, and to prevent waste in this direction each reader should take the simple step of asking a newsagent or bookstall clerk to reserve or deliver a copy weekly. This will help the newsagents and the publishers to regulate the supply according to the actual demand and to fulfil their orders without undue risk of copies being wasted.

How to find the Horse-power.

I have made several enquiries of supposed experienced men on the question of how to find the h.p. of an internal combustion engine, and none has been satisfactory. Would you please supply the necessary information?—H.B.

There are several ways of finding out the horse-power of an internal combustion engine. The only accurate way, however, is by means of a proper brake test—by measuring the power developed at the engine pulley by applying the brake to that portion of the engine, by calculating the pull in lb. and reading the revolutions per minute on a tachometer, or electrically, in which case the number of units of electricity developed by the engine are equivalent to so many horse-power. As regards formulæ, perhaps the most satisfactory is Hospitalier's, which is as follows: Square the radius of the piston in centimetres, multiply by the stroke in centimetres, multiply by the number of revolutions per minute, divide by 1,000, and again by 75. ·75 kilogram-metres per sec. equal 1 h.p.

Carburation and Air Leak.

I should be much obliged if you would kindly give me information on the following points: (1.) I have fitted a new carburetter to my 6 h.p. Clyno motor cycle, and find that the float chamber touches the rear cylinder and will consequently get very hot. I should be glad to know if there is any fear of fire; and, if not, will this assist carburation? (2.) How would you adjust 1915 Clyno tappets which have not the usual adjusting nuts fitted? (3.) Will you please tell me the best method of stopping air leak at the induction pipe unions?—R.H.M.

(1.) There should be no risk of fire, provided the liquid petrol does not come into actual contact with the exhaust pipe. The cylinder is not likely to become hot enough to ignite the petrol. The effect on carburation is theoretically beneficial, but practically negligible. (2.) You may obtain a set of tappet adjusters from any of the large accessory houses. These are small fitments specially designed for engines that are not provided with adjustable tappets. (3.) The best method is to screw up all joints carefully, but if this proves to be ineffective, the usual remedy is to wrap the joints round most carefully with insulating tape. While it is never as neat as the joint made in the correct manner, it is very often employed.

Removing the Small Timing Pinion.

?

Could you please tell me how the small timing gear pinion on the engine-shaft of my 4 h.p. Bradbury is fastened? Is it screwed on with a left or right-hand thread, with a screw let in the centre of the shaft to expand it after the pinion is screwed home?—W.C.

The timing pinion is fastened by means of a conical-headed screw expanding a split engine-shaft, which carries the pinion round by means of a key. All you have to do, therefore, is to remove the screw and lever off the pinion.

Decarbonisation.

?

(1.) What is the best and most successful method of removing carbon deposit from the cylinder head? (2.) Is it an indication of faulty piston rings when a portion of the piston is black and not bright like the other portion of it, and will the result be "loss of compression"? (3.) Down the side of my magneto, on the outside, are the letters "BDHLER." Do these letters indicate the maker's name, and if so, what is it?—Amateur.

(1.) Remove the cylinder and scrape with a screwdriver, blunt chisel, or other suitable scraper. (2.) Yes, the black mark shows that the charge is leaking past the piston rings, and will cause loss of compression. It is caused by faulty rings. (3.) We regret to say we do not know the magneto. It looks as if the letters mentioned refer to the maker's name.

Charging Accumulators by a Magneto.

?

I have a small old type single-cylinder Simms magneto. Is it possible to convert it into a generator for charging a small accumulator for lighting purposes and not use it as a magneto, or is a magneto not suitable for anything else but for a sparking plug? It is only for hobby work that I require it.—H.A.E.

There is no reason whatever why an old magneto should not be quite successfully converted into a small generator suitable for battery charging and lighting, but it will be necessary to take out the armature, rewind it, and fit a commutator. This is by no means too difficult for anyone accustomed to using a few tools, and with a mechanical turn of mind. The reason for fitting a commutator is that the current from a magneto is naturally alternating, and would not do for accumulator charging. The commutator, however, need only be a simple two-part affair. Before removing the armature a piece of iron must be laid across the poles of the field magnets, and must remain there until the armature is replaced; otherwise the magnetism may be lost. As the magnet in question is an old one, and may have been lying about for some time, it would be as well, while the armature is being rewound, to have the magnets remagnetised. Full information on making small dynamos such as this will be found in a sixpenny book called "Small Dynamos and Motors," published by Messrs. Percival Marshall and Co., being No. 10 of the *Model Engineer* series of handbooks.

Tube Bending.

?

Would you please tell me the best way of bending the handle-bars of my 2¾ h.p. T.T. Douglas? I wish to bend them outwards and downwards, as I do not like them as they are at present. Could it be done satisfactorily by means of a Bunsen burner?—J.B.

The handle-bar could be bent by means of a Bunsen burner, if the latter were held under the place you wish to bend, but the bending of tubes requires a certain amount of skill. To avoid kinking the tube should be tightly filled with sand, but very much depends upon the acuteness of the bend desired. Unless you are experienced, you would be better advised to take the job to a competent repairer.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

Engine will not Start.

?

Would you kindly suggest the probable cause of the trouble with my 2¾ h.p. Calthorpe-Jap? I cannot get it even to fire. I have checked the magneto and valve timing and seen that the petrol gets into the cylinder all right.—R.B.B.

The trouble may be due to a defect in the magneto, and you do not state if it is sparking properly; or to air leaks at the carburetter or induction pipe unions, which would prevent the engine from starting.

A Soldier's Permit.

?

I wish to ask you if I can take my brother (a convalescent soldier) out for an airing in my sidecar. I have the petrol by me from last year's permit; and as I have not seen anything in your paper lately on this question, I want to be on the safe side. I have taken out my driving licence and local taxation licence for this purpose. I should also like to ask your advice and opinion on a plug I had from a friend. Instead of the ordinary porcelain, it is made of transparent material like quartz, and when the engine is running it is illuminated like a powerful electric light.—J.W.

If your brother is convalescent after service Overseas, you will be able to take him out in the sidecar, provided he applies to the Petrol Controller's Department, 19, Berkeley Street, London, W.1, for a permit to use the machine, giving its registered number. The plug is probably a quartz plug, designed so as to show the colour of the explosion in the combustion chamber, thus indicating the quality of the mixture and showing whether it is correct or not. There is no reason why you should not use it.

READERS' REPLIES.

Low-tension Magnetos.

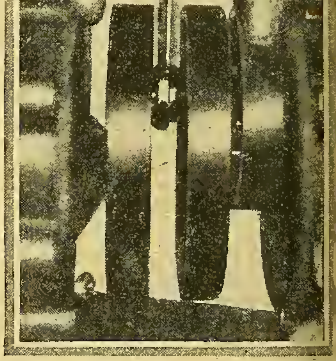
In the "Questions and Replies" s tion of your issue for April 18th, y correspondent "C.L.D." asks for book on low-tension magnetos. I hav 1911 handbook containing a section wh deals with low-tension magnetos, should be pleased to let him have if he will send his address along A. C. Nevin.

Mysterious Two-stroke Trouble.

As the owner of a two-stroke cycle have been troubled with the same d culty as your correspondent. My exp ence was identical in every respect. getting the machine thoroughly examir I was informed that the magneto the cause of the trouble, there bein slight wear or rub of the fabric surrou ing the coil wire at one place, wh would probably cause a short circ The magneto having been exchanged, trouble has disappeared.—E.A.S.

Truing Up Flywheels.

I send you a photograph of the met I employed to true up the flywheels my A.J.S. motor cycle. After a gla at the photograph the idea does not r much explanation. The two halves of crank case are lightly secured to bench and the flywheels revolved. It then be seen if they run truly or adjustment.—David B. Bright.



A method of truing up flywheels.

RECOMMENDED ROUTES.

Leamington to Derby.—W.H.

Leamington, Kenilworth, Cove y. Shilton, Hinckley, Ibstock, Ashby-d a-Zouch, Derby.

Redditch to Rhyl.—Q.T.

Redditch, Bromsgrove, Kiddermin er Bridgnorth, Wellington, Hodnet, V itchurch, Wrexham, Mold, St. As h Rhuddlan, Rhyl.

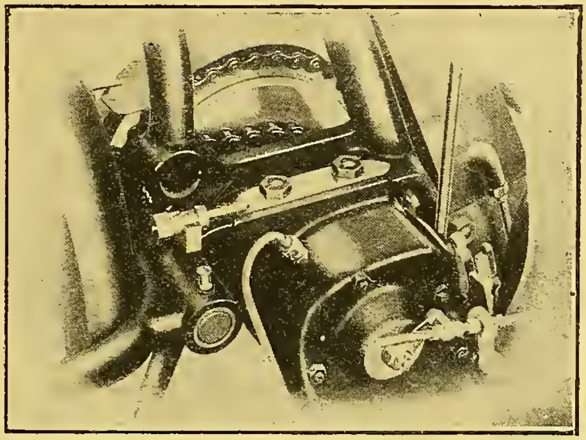
Coventry to Eastbourne.—B.E.

Coventry, Southam, Banbury, Ox d. Dorchester, Henley, Twyford, Wo gham, Sandhurst, Frimley, Worples n. Guildford, Cranleigh, Horsham, (kfield, Ditchling, Lewes, Polegate, stbourne. Approximately 180 miles.

A Post-War Feature of the

1918 Powerplus Indian Motocycles

We regret that we are not in a position to supply motorcycles at the present time, but we can send 1918 abridged descriptive lists on application. This applies to Great Britain —— only. ——



The Powerplus Gear Box showing micrometer adjustment. By turning the nut at the left, the box can be moved to get the correct tension on the short chain.

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MANUFACTURING CO.,

"Indian House," 366-368, Euston Road,
London, N.W

Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."

AUSTRALIA—
109-113, Russell St., Melbourne.

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Indian House, 127-9, Commissioner St., Johannesburg.
Indian House, 579, West St., Durban.
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to foretell the future. Many of them try, with what degree of success is known to themselves. But in this everyday world of facts, it is the *known*, and not the unknown, that counts. That is one of the reasons for the popularity of

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Here is no mystery, no uncertainty. They are what they claim to be—a union of the finest materials with the best workmanship. Their future is known before they leave the factory, and is summed up in the one word—SERVICE.

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Telegrams: "Wudmiln, Manchester." Telephone: City 8774
LONDON ... 42-46, WIGMORE STREET, W.1
Phone—Mayfair 735, 6789, 6790. Wire—Wudmiln, Wesdo, London.
Preston, Bristol, Leeds, Belfast, Birmingham, Glasgow, Dublin, Newcastle-on-Tyne, etc.

M.C. 511

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns—First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

1916 4h.p. A.J.S. Combination, spare wheel; bargain, £66.—86, High Rd., Lee. [4976

A.J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

A.J.S., 2-speed, lamp, horn, £35; 1914, 3-speed, Lucas lamp, mechanical horn, spare tank, £42/10; new Military Model also supplied; E.P. or exchange.—Service Co., 292, High Holborn, London. [X4067

1916 4h.p. A.J.S., No. 8,070, complete with 2 lamp sets, mechanical horn, Cowey speedometer, pump, set of tools, approximate mileage 3,000, in perfect condition; £75.—Robinson's Garage, Green St., Cambridge. [4943

A.J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; £91/6; no permits required.—P. J. Evans, sole agent for Birmingham and district, 87-91, John Bright St., Birmingham. [4945

A.J.S. 1915½ 6h.p. De Luxe Combination, special engine, detachable wheels, spare wheel, with voiturette tyre and waterproof cover, special wind screen, apron, Lucas horn, and head, side, and tail lamps, speedometer, fast machine.—Wauchope's, 9, Shoe Lane, London. [5018

A.J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [4997

IF IN NEED OF A Motor Cycle or Combination

EITHER FOR WAR WORK or BUSINESS PURPOSES,

WRITE TO

GODFREY'S LTD.

They can supply you from stock, and you can rely on getting value for your money.

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DEFENCE OF THE REALM AC

Under the provisions of the above Ac advertisers requiring workmen, and who business consists wholly or mainly engineering or the productions of munitio of war, or substances required for the pr duction thereof, and whose works a situated within 30 miles of London, mu include in every such advertisement t words, "No person resident more than miles away, or already engaged on Gover ment work, will be engaged."

Advertisers whose works are situat more than 30 miles from London can on have their announcements inserted wi the approval of the Board of Trade, wi will allocate to each advertisement a b number, and collect and distribute to t advertiser all replies received. The nece sary forms of application can be obtain from any Labour Exchange or from t offices of this paper, and each advertis ment must contain a clear reference to t effect that no person already engaged Government work need apply.

MOTOR CYCLES FOR SALE.

Alldays.

ALLDAYS Matchless, 1916 model, 2-stroke, 2 3-speed, free engine, not used last 9 months —Sgt. Graham, 322030, N.C.O. Mess, Richboro', [

ALLON, 2¾h.p., single, £38, new; 2-speed, £45, 2-speed and hand clutch, £48, new; 2 £28/10; E.P., or exchange.—Service Co., 292, Holborn, London. [

ALLON, 2¾h.p., brand new, 2-stroke, never b the road, and guaranteed; reduced price Mandes' Motor Mart, 100, Gt. Portland St., L W.1. Tel.: 552 Mayfair.

Ariel.

1914 5-6h.p. Ariel 3-speed Combination; b £38.—86, High Rd., Lee.

CROW Bros., Guildford.—Ariel, latest 3½h.p., countershaft models in stock.

Bat.

BAT, 1915-1916 model, 6h.p. twin, 2-speed c shaft gear, round tank; £45; guaranteed.- chope's, 9, Shoe Lane, London.

Brown.

BROWN, 3½h.p., Bosch mag., h.b.c.; £6.— Baker, R.N.A.S., Sleaford. [

B.S.A.

B.S.A., I.O.M. model, 3-speed; £37/10; E.P. change.—Service Co., 292, High Holborn, L [

B.S.A., 1914, 4¼h.p., chain drive, and B.S.A car, excellent condition; £45.—Clarke, Place Hadleigh, Suffolk. [

B.S.A. and Sidecar; a bargain, £25.—Wilkins, son and Co., 11, Hammersmith Rd. (o Olympia), London.

Calthorpe.

1915 2¾h.p. Calthorpe-Jap, 2-speed, fast; £2 High Rd., Lee.

1915 Calthorpe-Jap, 2¾h.p., 2-speed, almost bargain, £25.—D., Napier Lodge, Minster, T

CALTHORPE Junior, good condition, 2-speed engine, runs well on paraffin; £16.—12, St. Rd., Wandsworth.

CALTHORPE-J.A.P., 2¾h.p., 1917, not done Enfield gear, accessories; £32, or near Machin, Ivies, Hereford Rd., Abergavenny. [

CALTHORPE 2-stroke, Enfield 2-speed, new slightly shop-soiled; special bargain, £25/15. kins, Simpson and Co., 11, Hammersmith Rd., L

CALTHORPE-J.A.P., 2¾h.p., new models, £ new single-speed model, £32; also a secon Calthorpe, £15.—Wauchope's, 9, Shoe Lane, Lon

CALTHORPE Motor Cycles.—All models in st immediate delivery; trade supplied; no required.—P. J. Evans, 91, John Bright St., Bi ham.

Chater-Lea.

1915 7-9h.p. Chater Combination, 3-speed; £5 High Rd., Lee.

Clement.

2¼h.p. Clement, new mag. and B. and B.; b £10.—152, Camberwell Grove. Camberwell.

MOTOR CYCLES FOR SALE.

Clyno.

NO 1914-15 Combination, 6h.p., 3 speeds, kick tarter, and free engine, detachable wheels, spare e and tyre, hood and screen, beautifully sprung de sidecar, all accessories; £65, guaranteed.—Wau- s, 9, Shoe Lane, London. [5024

Connaught.

4 2¾h.p. Connaught, 2-speed, good order; £18.— 86, High Rd., Lee. [4963

Coventry Eagle.

ENTRY Eagle, 2½h.p., 2-stroke Villiers engine, brand new, and guaranteed, but shop-soiled only; Maudes' Motor Mart, 100, Gt. Portland St., Lon- W.1. Tel.: 552 Mayfair [4903

Dean.

AN-PRECISION, 1914, 3½h.p., sidecar, guaran- eed perfect order throughout, 3-speed, K. start, lamps, etc.; cheap to quick buyer.—Apply, 86, edale Gardens, London Rd., Thornton Heath. ings.) [X4019

Dot.

T-J.A.P., late 1914, 2 speeds, chain, accessories, Premier sidecar, all like new; £40.—Write, 1, bell Rd., Croydon. [X3793

Douglas.

12 2¾h.p. Douglas, 2-speed, good order; £17.—86, High Rd., Lee. [4982

13 2¾h.p. Douglas, 2-speed, good order; £25.—86, High Rd., Lee. [4968

UGLAS, 1912-13, 2-speed, very fast; 16 gns.—77, Acre Lane, S.W.2. [5010

UGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

UGLAS, 1915, 2-speed, all accessories, splendid condition; £36.—Shillan, 37, Atherton Rd., Forest [4994

UGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, il. Tel.: 50. [5855

15 4h.p. Douglas, 2-speed, lamps, horn, etc., perfect order, and good as new; £46.—Abergele r Co., Abergele, N.W. [X3775

UGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, ouglas agent, 196 Cheltenham Rd., Bristol. [0923

UGLAS, 2¾h.p., 1915, 2-speed, new engine, mag., and carburetter, excellent condition; £45.—Pay- er Walpole, Bramber Cottage, Bramber Rd., Sea- [5027

UGLAS, 2¾h.p., 1915 engine, mag. and carburetter complete, excellent condition; what offers?— taat Paymaster Walpole, Bramber Cottage, Bramber Seaford. [4913

13 Douglas, 2¾h.p. twin, 2-speed gear, footboard, usual accessories, splendid condition, very fast; —R. Bamber and Co., Ltd., 33, Liverpool Rd., Birk- Lancs. Tel.: 44. [4858

UGLAS, 4h.p., 3-speed, kick start, all lamps, tyres nearly new, speedometer, Xl'all saddle, Mills-Ful- sidecar, all in good condition; £65.—Cole, Brook- , Victoria St., Hereford. [X3784

UGLAS 1915 Genuine 4h.p. Combination, 3 speeds and kick start, coachbuilt sidecar, wind screen, all sories, requires small adjustments only; a bargain, —Maudes', 100, Gt. Portland St., London, W.1. 552 Mayfair. [4904

17 4h.p. Models A. and B. Douglas, 2¾h.p. Model W., also U. and V. 1916 specification, absolutely immediate delivery against Priority Permit for rs, farmers, war and munition workers.—How and e to apply, full particulars, write Douglas Specialists, nson's Garage, Green St., Cambridge. [4942

Enfield.

14 3h.p. Twin Enfield, 2-speed; £25.—86, High Rd., Lee. [4974

p. Enfield Combination, good condition; £49.—Particulars, Tyler, 15, Trinity St., Salisbury. [4937

FIELD Combination, 1916, 6h.p., fully equipped, not run 4,000 miles; £65; no reduction.—John am, Edmond Castle, Carlisle. [X4009

FIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter r Cycle Co., Ltd., Bath Rd., Exeter. [3522

FIELD 6h.p. 1916 Combination, coachbuilt sidecar, light car tyres, fully equipped; £85.—Mebes Mebes, 154-6, Gt. Portland St., W.1. Tel.: 3426 fair. [5006

17 6h.p. Royal Enfield Combination, Stewart speedometer and horn, wind screen, fully equipped, used; £90.—E. G. Chapman, Cleveland, Wade- e, Cornwall. [4921

p. Enfield Combination, 1916, fully equipped, and ready for the road, lamps, horn, Cowey speed- er, new spare tyre and tube; £85.—Murgatroyd, u St., Bolton. [X4020

p. Enfield Motor Cycle, 1914 model, Bosch mag., horn, speedometer, gas and electric light, tyres used, two new driving chains, full set tools, good ing order; price £19; can be seen in Folkestone.— e Box L6,094, c/o *The Motor Cycle*. [5035

FOR EXCHANGES.

NEW MACHINES IN STOCK.

	£	s.
1918 **MATCHLESS** Combination, 8 h.p., M.A.G., spare wheel	£125	0
1918 **A.J.S.** Combination, 6 h.p., W.O. model, spare wheel, screen, storm apron	£120	0

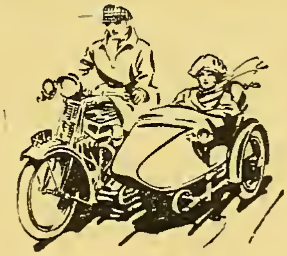
SECOND-HAND COMBINATIONS.

	£	s.
1918 **MATCHLESS** Combination, W.O. model, J.A.P. engine, electric lights, spare wheel	£120	0
1917 **HARLEY-DAVIDSON** Combination, magneto model, lamps, horn	£115	0
1916 **SUNBEAM** Combination, 8 h.p., M.A.G., lamps, horn, etc.	£105	0
1915 **SUNBEAM** Combination, 6 h.p., Lucas dynamo lighting, fully equipped, spare wheel	£110	0
1916 **ENFIELD** Combination, 6 h.p., lamps, horn, hood, screen	£85	0
1916 **NORTON** Big 4 and sporting Sidecar, lamps, horn	£75	0
1916 **B.S.A.** and Sidecar, 4¼ h.p., lamps, horn	£65	0
1914-15 **MATCHLESS** Combination, 8 h.p., M.A.G., lamps, horn	£65	0
1913 **ENFIELD** Combination, 6 h.p., lamps, horn	£45	0

	£	s.
1917 **NEW IMPERIAL**, 2¾ h.p., 2-speed, T.T. bars	£30	0
1914 **DOUGLAS**, 2¾ h.p., 2-speed, T.T. bars	£35	0
1912 **TRIUMPH**, 3½ h.p., clutch model, just overhauled	£20	0

ELCE & Co.

15-16, Bishopsgate Avenue,
—Camomile Street, E.C.3.—
'Grams: "Elcemocyca, London."
'Phone: Avenue 5548.



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ENFIELD, late 1915, 3h.p. twin, and lightweight C.B. sidecar, £42/15; motor cycle only, £35; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X4078

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1917 6h.p. Royal Enfield Combination, with their very latest improvements, specially smart, and in sound mechanical condition; £87/10, bargain, and guaranteed; also a 1916 model, also in grand condition, £75; 1914 model, completely overhauled, £55; 3h.p. 1915 2-speed Royal Enfield, £32/10; 1914 model, £25; 2¼h.p. 2-stroke, £35; all good bargains, and guaranteed. —Wauchope's, 9, Shoe Lane, Fleet St., London. [5025

F.N.

F.N., 5-6h.p., 1914, 2-speed, hand-controlled clutch, kick start, splendid condition; £36, or offer.—Anthony, 44, Newburgh Rd., Acton, W.3. [5004

Harley-Davidson.

1916 Harley-Davidson Combination, electric model, very good order; £80.—Below.

1917 Harley-Davidson Combination, mag. model, lamps, horn; £115; exchange entertained.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0552

1915 7-9h.p. Harley Combination, perfect order; bargain, £50.—86, High Rd., Lee. [4967

70 Gns.; everything complete.—Late 1915 Harley-Davidson coachbuilt combination, practically new, returned owner no further use, all accessories, very little used, with petrol licence, etc.—Miller, 62, Hampstead Rd., N.W.1. [4838

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1911 3½h.p. Humber, 2-speed, powerful; bargain, £10.—86, High Rd., Lee. [4970

HUMBER 6h.p., solo, or with sidecar; very limited supply available; immediate delivery.—Apply, 32, Holborn Viaduct, E.C. [X4015

HUMBER, 1915, 3½-4h.p., T.T., single model, hardly used, perfect condition throughout; £25.—E.T., 19, Vicarage Rd., Chelmsford. [X3978

2¾h.p. Humber Twin, free engine, speedometer, clutch, hardly scratched; any trial; 1915; £18.—P., c/o Whyte, Newsagent, Strood, Kent. [X4010

1914 Humber 2¾h.p. Twin, 3-speed gear, clutch, usual outfit, in splendid condition throughout; £20.—R. Bamber and Co., Ltd., 33, Liverpool Rd., Birkdale, Lancs. Tel.: 44. [4856

OFFERS Wanted.—Four brand new 3½h.p. flat twin Humber motor cycles, 3-speed countershaft gears, unscratched; exchanges entertained, or cheap for cash. —Crabtree, 6, Church Terrace, Wisbech. [4775

Indian.

1914 7-9h.p. Indian 2-speed Combination, accessories; £36.—86, High Rd., Lee. [4985

1915 5h.p. Red Indian, T.T. Model, 3-speed, clutch; 38 gns.—Railway Garage, Staines. [4927

INDIAN, 1914, 7-9h.p., spring frame, 2-speed, clutch model, painted service green, excellent condition, lamp, horn, and tools, tyres as new; £30, or near offer. —Lieut. Sawyer, Experimental Grounds, Wembley, Middlesex. [4822

Ixion.

1914 2½h.p. Ixion, 2-stroke, good order; £12.—86, High Rd., Lee. [4984

James.

4¼h.p. James, late 1914, waterproof Bosch, re-enamelled, plated, overhauled; any trial; £25, or offers. —46, Ampthill Rd., Bedford. [4996

JAMES, all new models; extended payments or exchange; also 3½h.p. twin, 3-speed, kick starter, complete with Lucas lamp, £45.—Service Co., 292, High Holborn, London, W.C.1. [X4073

J.A.P.

1913 4h.p. J.A.P., 2-speed; bargain, £15; appointment.—53, Brownhill Rd., Catford. [4964

MOTOR CYCLES FOR SALE.

Levis.

1917 2½h.p. Levis, 2-speed, chain drive; £30.—86 High Rd., Lee. [4969

LEVIS, 1916, single, £22; E.P. or exchange.—Service Co., 292, High Holborn, London. [X4082

LEVIS, 2½h.p., Model E, Enfield 2-speed, chain drive brand new, in stock; £47/10.—Wilkins, Simpson and Co., 11, Hammersmith Rd., London. [4934

Matchless.

1915 8h.p. Matchless, dynamo lighting, spare wheel: £76.—86, High Rd., Lee. [4977

MATCHLESS Latest War Model Combination, complete with detachable wheels, spare wheel and tyre: £120.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3523

MATCHLESS 8h.p. Combination, J.A.P. £75, or M.A.G. engines £67/10; 8h.p. combinations, new, fitted with J.A.P. or M.A.G. engines; E.P. or exchanges. —Service Co., 292, High Holborn, London, W.C.1. [X4074

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1914 New Hudson, 6h.p., 3-speed, coach sidecar; £45.—50, Etherley Rd., West Green, N.15. [4990

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1915 2¾h.p. Imperial-Jap, 2-speed, powerful; £22.—86, High Rd., Lee. [4980

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NORTON Big 4, all-chain drive Military Model; £82. —Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3524

NORTON Combination, 1914, 3-speed, Cowey speedometer; £38.—45, Reginald Rd., Saltley, Birmingham. [X4055

NORTON, 1916, 3½h.p., 3-speed countershaft, clutch and kick start, Canoelet sidecar, all accessories; reduced price £58.—Maudes', 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [4905

4 BIG Norton, 1917 model, the latest all-chain driven countershaft model, 3-speed, clutch, and kick starter, includes tools and accessories; lowest £67/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5023

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3½h.p. N.S.U., waterproof Bosch, B. and B., 2 speeds, free engine, sidecar; sacrifice £15; guaranteed; any trial.—46, Ampthill Rd., Bedford. [4995

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1915 N.U.T., 2¾h.p. twin J.A.P. engine, overhead valves, 3-speed gear, lamps and accessories, T.T. model, very fast, and in beautiful order throughout; price £40.—R. Bamber and Co., Ltd., 33, Liverpool Rd., Birkdale, Lancs. Tel.: 44. [4857

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4¼h.p. Precision, Bosch mag., silencer. engine plates, B.S.A. carburetter, good condition, £16; Sturmey-Archer wheel, 26×2¼, complete, perfect, £7/10.—Slack, Butts Rd., Barton-on-Humber. (D) [X4022

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2½h.p. Premier, 1914-15, nearly new condition; £22. —Moss, 378, Kingsland Rd., Dalston, E.8. [5008

PREMIER, 3½h.p., clutch, 3-speed, kick start, Dunlops nearly new, 3 lamps, horn, tools, and Canoelet coachbuilt sidecar with screen; £27/15.—Wilkins, Simpson and Co., 11, Hammersmith Rd. (opposite Olympia), London. [4932

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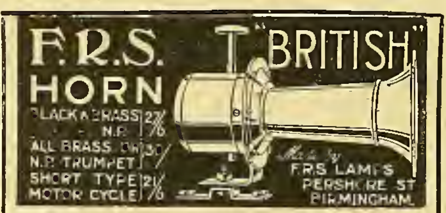
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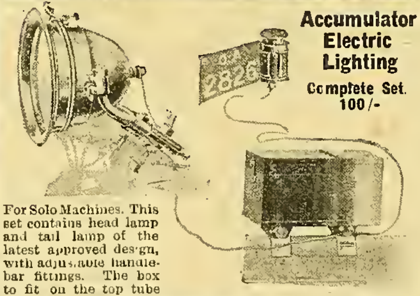

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5-6h.p. Twin Rex, 2-speed, Bosch mag., B.B. etter, new Avon belt, good tyres, just be hauled; a bargain, £25.—Apply to F. Badd Prince of Wales Rd., Swansea, South Wales.

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1914 3½h.p. Rover, 3-speed, very fast; £34.—8 Rd., Lee.

ROVER.—All new models supplied; also 3½ speed, £27/10; E.P. or exchange.—Serv 292, High Holborn, London.

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ROVER Motor Cycles, 3½h.p. and 5-6h.p. m stock for immediate delivery, both solo a car outfits; trade supplied; no permits requi J. Evans, 91, John Bright St., Birmingham.

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1914 2½h.p. Royal Ruby, 2-stroke, wants £10; appointment.—53, Brownhill Rd.,

ROYAL Ruby, 1915, 2-speed, 2-stroke, Bosch etc.; £27.—Thomas, 6, Mount Pleasant, Stratford. (D)

1918 Royal Ruby, new, 2¾h.p. J.A.P., 2-spe minium running boards; £46.—Abergele Co., Abergele, N.W.

ROYAL Ruby.—All new models supplied; also speed, £19/10; E.P. or exchange.—Servi 292, High Holborn, W.C.1.

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1914 T.T. Rudge Multi, disc wheels, speed Klaxon horn, knee-grips, Lucas lamps, clo roll, spares, etc., excellent condition throughou no offers.—H.B., 24, Rochester Terrace, Chatham

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1915 Standard Scott, with coachbuilt sidecar did condition throughout, all spares and sories; £40.—Officer, c/o Woodford Wells Motor Woodford, Essex.

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SPARKBROOK, 1916, 2-stroke, 2-speed, and gine gear, spares, and accessories, little us in excellent order, strong, reliable machine; 3 Robinson, Magherabeg House, Donegal.

1917 (late) Sparkbrook, 2¾h.p., 2-stroke, gear, usual accessories, only used short absolutely as new; bargain, price £30.—R. Baml Co., Ltd., 33, Liverpool Rd., Birkdale, Lancs. T

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SUN-VILLIERS, 2½h.p., 2-speed countershaf £37/16; V. T.S., single speed, new, £30/1 or exchange.—Service Co., 292, High Holborn,

Sunbeam.

1917 (May) Latest 3½h.p. Military Sunbeam, T. unused since November, Lucas set, mec horn, complete; offers.—Lord, Mountfield, Pres

SUNBEAM Combination, 3½h.p., 3-speed count kick starter, and free engine, complete w best accessories, nice lot, fully guaranteed, £ Wauchope's, 9, Shoe Lane, London.

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1916 Sunbeam Combination, 8h.p. M.A.G., horn, screen, very good condition; £10 change entertained.—Elce and Co., 15-16, Bish Av., Camomile, E.C.3.

SUNBEAM 3½h.p. Combination, absolutely £95; 1915 3½h.p., countershaft, 3-spee starter, mechanical horn, coachbuilt sidecar, £6 or exchange.—Service Co., 292, High Holborn,

SUNBEAM, 1917 Military Model, semi T.T. speed countershaft gear, kick starter, clut all accessories, double tank, grey finish, good sou dition; £77/10; guaranteed.—Wauchope's, 9, Sho London.

SUNBEAM 3½h.p. 1916 Combination, cost w few coppers of £100, price £56, no offers complete outfit to run on substitute, Clinch quality tyres on all 3 wheels, side shields t wheels, Lucas King of the Road head light, F.E lamp, all rubber tubing, sidecar lamp, long h necessary spares.—Jas. Paul, Clock Specialist, 12 St., Perth.

MOTOR CYCLES FOR SALE.

Swift.

T and C.B. Sidecar, 1915-16, 3½h.p., clutch, and .S., complete with lamp and horn, splendid con- £49/10; E.P., or exchange.—Service Co., 292, Holborn, London, W.C.1. [X4076

Triumph.

4h.p. Triumph, 3-speed, nice order; £34.—86, High Rd., Lee. [4986

3½h.p. Triumph, good order; bargain; appointment; £12.—53, Brownhill Rd., Catford. [4981

Triumph Coach Combination, 3-speed Sturmey; £29/10, bargain.—603, Lord St., Southport. [X4021

3½h.p. Free Engine Triumph, Bosch, Philipson, light coach sidecar, good order; £32, or nearest G. Pugh, Trawsfynydd. [4930

UINE Bargain.—3½h.p. clutch Triumph, Philipa pulley, perfect order; £17/10, for immediate . Webster, Warwick Rd., Kenilworth. [X4056

JMPH, 3½h.p., £17/10; 1912-3, Bosch mag., A. free-wheel clutch, £26/10; E.P., or exchange. Service Co., 292, High Holborn, W.C.1. [X4072

Triumph, 3-speed countershaft, clutch, kick start, recently overhauled, accessories; £63; ex- Carden and cash.—Farnfield, 30, George Rd., ord. [5005

UMPH M.C. and Sidecar, purchased 1914, 3 peeds, free engine, excellent condition; 30 gns.— Box 40, Greenlys, 37, Strand, W.C.2. Also y-Archer and Armstrong gear parts for sale. [5031

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UMPH, 1916, 4h.p., 3-speed countershaft model, oachbuilt Millford sidecar, all accessories, £76; ph, 1914, 4h.p., 3-speed combination, complete new Montgomery coachbuilt sidecar, lamps, and £52; another, as above, but minus sidecar, all ries, £38; Junior Triumph, 1915, 2 speeds, 2- all accessories, £33; all guaranteed.—Maudes' Mart, 100, Gt. Portland St., London, W.1. Tel.: ayfair. [5038

Vindec.

DEC Special, 5h.p., sidecar, good condition, 2 ears; sacrifice £15.—Grimmer, Ampthill, Beds. [4890

Wolf.

4 2¾h.p. Wolf, 2-stroke, single gear; £12.—86, High Rd., Lee. [4972

T.—1915 Wolf 2-stroke, running order, but wants verhauling; first for £11 secures.—P. Webster, k Rd., Kenilworth. [X4057

Wolf, 2-stroke, kick start, 2-speed, h.b.c. clutch; 1914 A.J.S., 2-speed, h.b.c. clutch (unused 18), in perfect order, Bosch mag., DU2, new, E.I.C. er coil, brand new; or will exchange 1916 or 6h.p. combination, A.J.S., cash either way.— s, 54, Gibbon St., Plymouth. [X4088

Yale.

E 7-9h.p. Coachbuilt Combination, driven 2,000 iles only, absolutely as new; expert examination ; £75, or offer; player-piano wanted.—S. C. Hudhemist, 34, Lodge Drive, Palmers Green. [X3974

Zenith.

4 4-5h.p. T.T. Zenith-Gradua, countershaft model; £34.—86, High Rd., Lee. [4975

ITH-GRADUA, 8h.p., with 20 gn. sidecar, perect condition; great bargain, £40.—H., 23, Crockerd., Upper Tooting. [4912

ITH, 1915, 4h.p., w.c., Gradua gear, Jones speedmeter and horn; £45; E.P., or exchange.—Sero., 292, High Holborn, London. [X4079

Miscellaneous.

p. Motor Cycle, P.F. engine, 2-speed, Bosch waterproof, B. and B., Druid forks, good tyres, running order; £15.—Cyril James, Church Strethropshire. (D) [X4013

2¾h.p., footboards, horn, tools, new Dunlop tyre nd tube on back, spare tube, very low, built for good order; £15.—W. James, Royal Oak St., nchester, Huntingdon. [X3919

3 6h.p. 3-speed Bradbury and sidecar, £55; 1912- 1913 3-speed Bradbury and coach sidecar, £32/10; 3½h.p. 3-speed model, £29/10; 1913 2-speed chain Diamond, £25/10; 1912 single speed Douglas, 0; 1913, 2 speeds, £31/10; 1914, 2 speeds, 0; 1916 2-speed Enfield combination, £82/10; model, £72/10; 1914 model, £62/10; 4h.p. 2-speed , £22/10; 7-9h.p. free engine Indian, £23/10; 7-9h.p., 2 speeds, and sidecar, £45; 3h.p. N.S.U., eds, £11/10; 3½h.p., 2 speeds, and new coach r, £22/10; 5-6h.p. Rudge Multi and sidecar, £45; 2-speed 2-stroke Radco, £21/10; 6h.p. twin Rex, 0; 1915 8h.p. Zenith-Gradua, £55/10; send for Motor Exchange, 68, Horton St., Halifax. [4950

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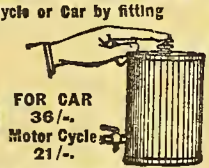

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JAMES, 1916, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £36.—See below.

JAMES, 1917, 2¼h.p., 2-stroke, 2 speeds, lamps and horn; £40.—See below.

JAMES 1915 4¼h.p. Combination, 3 speeds, clutch, and kick starter, all-chain drive; £60.—See below.

ROYAL Enfield, 1916, 2¼h.p., 2-stroke, 2 speeds, lamps, and horns; £38.—See below.

ROYAL Enfield Combination, 1916, 6h.p., lamps, horn, and speedometer; £78.—See below.

DOUGLAS, 1910, 2¾h.p., lamps and horn; £15.—See below.

DOUGLAS 1913 2¾h.p., Model V, head light, rear lamp and horn; £28.—See below.

DOUGLAS Combination, 1915, 4h.p. Lucas lamps and horn, Stewart speedometer and warning signal; £63.—See below.

WOLF-J.A.P., 1915, 2½h.p., countershaft 2-speed gear; £20.—See below.

ALLON, 1915, 2¾h.p., 2-stroke, excellent condition; £25.—See below

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RUDGE, 1916, 3½h.p., Multi gear and clutch, lamps and horn; £42.—See below.

TRIUMPH, 1910, 3½h.p., T.T. model, speedometer; £20.—See below.

PREMIER, 1913, 3½h.p., countershaft gear and clutch, fitted with coachbuilt sidecar; £38.—See below.

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CLYNO Combination, 1914, 6h.p., hood, screen, detachable wheels and spare wheel, complete, lamps, horn, and speedometer; £62.—See below.

A.J.S., 1912, 6h.p., 2-speed countershaft gear, clutch and kick-starter, and Gloria coachbuilt sidecar; £35.—See below.

LEVIS, 1915, 2¼h.p., 2-stroke, lamps and horn, new tyres; £20.—See below.

INDIAN 1914 7h.p. Combination, spring frame, dynamo lighting, electric starter, horn, speedometer, etc.; £60.—See below.

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SEVERAL Late Model Lightweights and Combinations in stock, fully equipped, at reasonable prices. Write us your requirements.—Mebes and Mebes, 154-6, Gt. Portland St., W.1. Tel.: 3426 Mayfair. [5007

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BARGAINS.—7-9h.p. Harley-Davidson combination, £59/15; 1916 Harley-Davidson 7-9h.p. combination, electrically equipped, £80/15; 1915 Harley-Davidson combination, £69/15; 1915 4¼h.p. B.S.A., with B.S.A. sidecar, £56/15; 1914 4¼h.p. B.S.A. combination, £45/10; 3½h.p. B.S.A., 1913, £15/15; 1914 6h.p. Zenith, countershaft gear, £33/10; 1912 Scott combination, £29/15; 3½h.p. Rudge, 1912, Grado gear, £18/15; 4h.p. Bradbury, 1911, Grado gear, coach sidecar, £21/10; 6h.p. Rex, 1909, £12/15; 3½h.p. Rex, 1910, £12/15; 3½h.p. Humber, 1911, 2 speeds, £18/15; 6h.p. Rudge, 1913, Multi gear, £29/15; 2½h.p. T.D.C., 1914, £12/15; 2¾h.p. T.D.C., 1915, £13/15; 2¾h.p. T.D.C., 1916, £15/10; 2¾h.p. Sun-Villiers, 1914 £14/15; 1910 Douglas, free engine, £14/15; 3h.p. Minerva, mag., £6/15; 3½h.p. Excelsior, £3/19; 5h.p. Kerry, £6/10; Auto-Wheel, requires crankshaft mending, £4/5; 1914 Crouch car, detachable wheels, £65. Send for detailed list.—Booths Motories, Portland Place, Halifax. 'Phone: 1062. [4938

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1916 Indian Powerplus Combination, as new; £90.

1916 Indian Powerplus Combination, as new; £87/10; both electric models.

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1912 6h.p. Rex, solo; £20.

3½h.p. Brown, 2-speed N.S.U.; £19/10.

1912 Douglas, 2-speed, in splendid order, newly enamelled; £25.

ALL the Above Machines are guaranteed in the best of order, and sent on approval, deposit.

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SIDECAR, coach body, used twice, quick detachable, 4-point; genuine bargain at £6/6.—Gordon Stewart, Ipswich. [4989

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PHŒNIX Sidecars, new and second-hand; also several new stock soiled to clear; 100 complete sidecars always in stock; list free.—Phœnix Sidecars, 736, Holloway Rd., London. [2333

NEW Gloria A1 Sidecar, 4-point, luggage grid, storm apron, mat, locker under seat, 2 pockets for maps; cost £19/19, sell £14/14, or exchange for 2-stroke.—Vickers, Newsagent, Brandon, Durham. [X3843

FIVE New Undersling Latest Pattern Chassis, complete with all fittings and fourth attachment, £5/10; ten new sidecar chassis, £3/5; £14 Montgomery coach sidecar, £5/15; cane sidecar, complete, 50/-; sidecar fittings of all descriptions.—Booths Motories, Halifax.

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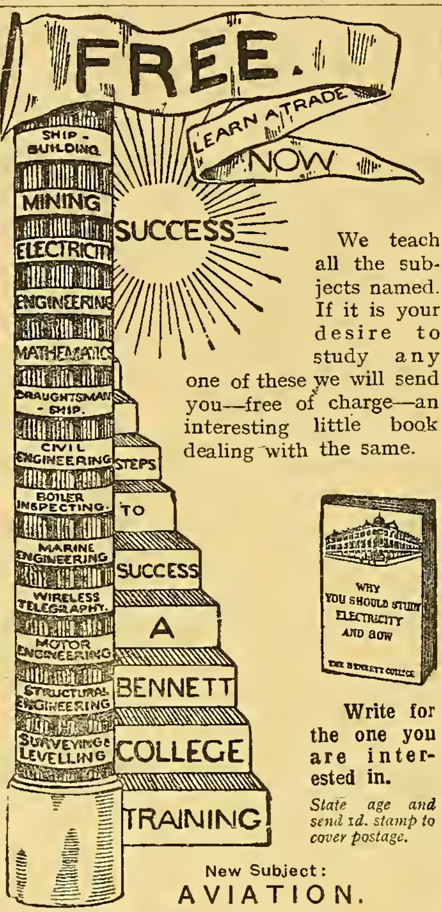

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Write for the one you are interested in.

State age and send 1d. stamp to cover postage.

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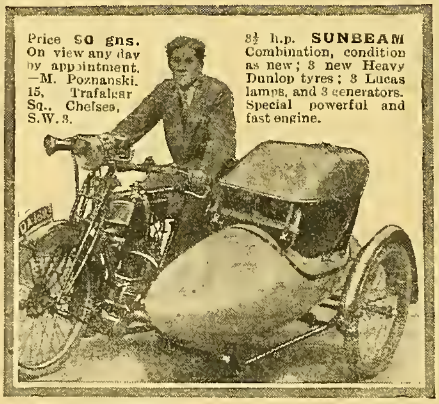

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8½ h.p. **SUNBEAM** Combination, condition as new; 3 new Heavy Dunlop tyres; 3 Lucas lamps, and 3 generators. Special powerful and fast engine.

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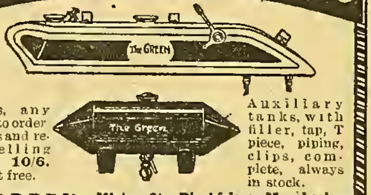

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WIND Screens, 7 patterns, for sidecars, 19/6, 30/-, 32/6, and 45/-; sidecar hoods, 37/6 and 52/6.—Juno Showrooms, 248, Bishopsgate, don.

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CARS FOR SALE.

1914 Perry 2-seater, hood, screen, lamps, etc.; —Motor Exchange, Horton St., Halifax.

NEW Arrivals.—This week many new ones. Rem some almost new, and all dates advertised teed correct.

NEW Arrivals.—6h.p. 1912 Pilot light car, drive, mag., Zenith, scuttle dash, runs well, 15-cwt. De Dion van, solids, sliding gears, good tion, £25; 1913 Douglas, 2-speed, £25.

NEW Arrivals.—Water-cooled Girling 3-wheel about 1913, £35; 18h.p. Wolseley 1-ton van dual, £40; 20-28h.p. Darracq 25-cwt. van, 10f wheelbase, new gears, £45; 25-cwt. F.I.A.T. van, behind, Bosch, Claudel, £50.

NEW Arrivals.—15h.p. Talbot 15-cwt. platform dual, gate, 4 speeds, £50; 14-16h.p. Ball seater torpedo, low flush-sided body, smart, £5 ceptionally smart 1913 Humberette, £60; 15h.p. Studebaker, torpedo, monobloc, gate, repainted, 12-15h.p. Hillman 15-cwt. platform lorry, Bosch, Zenith, £75.

NEW Arrivals.—8-10h.p. Warne light car, live wire wheels, £75; 15-18h.p. N.A.G. 1-to chains, gate, dual, £75; 14-16h.p. Belsize chass ceptional condition, mag., gate, £85; Beeston H van, £85; 15-18h.p. Bedford-Buick chassis, dual pulls well, £90; 15h.p. 1913 Studebaker 2-seater, bloc, enclosed valves, cream, smart, £90; For extra roomy body, £95.

NEW Arrivals.—2-ton Berliet chassis, twin 13ft. 6in. wheelbase, £100; exceptionally Swift cycle car, 40 m.p.g., enclosed valves, gate, 10h.p. Turner light car, wide 3-seater, 4-cyl. mo enclosed valves, nice condition, £125; 12-15h.p. 4-seater, enclosed valves, worm drive, £125; smar Perry streamline 2-seater, detachable Sankey £135; 10h.p. Lagonda coupe, detachable wheels, monobloc, smart, £135; 1915 Horstmann sportin car, mechanical starter, 4-cyl. monobloc, deta disc wheels, smart, £145.

NEW Arrivals.—10h.p. 1915-16 Argo sporting 4- dynamo lighting, self-starter, disc wheels, new, £145; 15.9h.p. Gregoire chassis, nice con £150; 12h.p. Siddeley-Deasy, torpedo, enclosed detachable wheels, £165; extra special Ford torp landaulet, 7-seated English body, round back, front, curved roof, grey cloth interior, smart,

NEW Arrivals.—2-ton Thornycroft chassis, Daimler engine, twin solids, £200; with 20 single-decker saloon 'bus body, £225; 20h.p. Royce 1-ton platform lorry, 4-cyl., 4-speed gate, Claudel, detachable rims, runs beautifully, £250

STAR Arrival.—3-ton De Dion commercial chas lieved 1914 model, enclosed valves, live axle, radiator, steel wheels, twin solids, splendid con bargain, £485.

NEW Arrivals.—On view 9 to 6.30, including days. No business Sundays.—The Motor C House, the absolutely straight motor firm, 6c, downe Hill, West Norwood, S.E. (Full list i *Autocar*, *Motor*, and *The Motor Cycle* every week.)

WE have the following cars for sale for ca tended payments, or your motor cycle change: Enfield, Alldays, R.M.C., Morris-Oxford ard, Humberette, Morgan, Horstmann, and also van.—Full particulars on application.—Service Co High Holborn, London. [

RUNABOUTS AND CYCLE CAR

1914-15 Morgan, 8h.p. J.A.P. engine, hood, lamps, oversize tyres; £83/10.—Motor Ex Horton St., Halifax.

1914 Sporting Morgan, hood, screen, clock, ometer, lamps, etc.; £78/10.—Motor Ex Horton St., Halifax.

8h.p. Morgan, hood, screen, special upholstered lamps, spare cover and tube; £72/10.—Mot change, Horton St., Halifax.

MORGAN, 1914, splendid condition, speed screen, hood, lamps, Kempshall tyres, nearl 75 gns., or near offer.—Maynard, 34, Woodside, don, S.W.

A.C. Sociable 2-seater, 6h.p., mag., new tyres screen; any trial; sacrifice 23 gns.; exchang bination.—Wandsworth Motor Exchange, Ebn Wandsworth (Town Station).

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ESTABLISHED IN 1903

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SOUTH AFRICA—Central News Agency, Ltd. PARIS—Smith's English Library, 248 Rue Rivoli.

Military Motor Cycles.

THE introduction of the American standard motor cycle engine raises the important question whether for Army purposes it is better to use one type of motor cycle or several. The British D.R.'s (R.E. Signals) use two makes, Triumph and Douglas, the nominal h.p.'s being 4 and 2¾, and the capacities 550 and 350 c.c. The former is provided with a handle-bar controlled clutch—a very real advantage—and a three-speed gear, while in the case of the latter the Government has preferred to retain the pre-war model, which incorporated a two-speed gear only. Both these machines have done excellent work and both have their admirers. The more powerful machine is naturally the greater favourite, owing to its greater speed and power to plough through very heavy mud, but there are many occasions when the lighter weight of the Douglas gives it a great advantage, and renders it pleasanter and safer to ride. Some D.R.'s would vote for the Triumph in the summer and the Douglas in the winter time.

Then, again, we find that the R.F.C. have always favoured the P. and M., and many of these machines, with sidecars attached and lady drivers in the seats, are to be seen carrying Flying Corps officers from place to place with the most unfailing regularity. In Africa and elsewhere the B.S.A. has rendered a good account of itself, and more than one twin-cylinder machine, notably the Clyno and Enfield, has been fitted with machine guns or used for ambulance purposes.

Time will show whether the American standard engine can take the place of all these various types. Opinions differ, although the big American twin is tractable as well as powerful, and the clutch will doubtless be a good one. It ought to be able to plough its way at a slow pace through the deepest of mud without becoming unduly hot. (The small British machine was at a disadvantage here, though in many ways it excelled as a bad weather mount.) It has power and speed even when fitted up with a sidecar. But many occasions must of necessity arise when the riders will wish themselves the possessors of lighter and handier mounts. Power is wanted at all times and still more extreme reliability, but sometimes handiness will be more valuable than power.

When we consider the question of spare parts and replacements, it must at once be admitted that the standard machine has the advantage all the time. There is no need to labour the point—it is too obvious—but using a 1,000 c.c. engine for all purposes must sometimes be like using a steam hammer to crack a nut; it will do it excellently and without crushing the kernel, but it can be done more cheaply and expeditiously in other ways.

British experience suggests that variety is, on the whole, desirable, for conditions vary very materially on the different fronts and at different times of the year.

A Point of Design.

Quite outside the military question, the American standard army motor cycle engine is a most interesting production in that it represents the combined effort of the best brains employed in the American motor cycle trade. Any innovation or point of design found in it should therefore be treated with respect and carefully considered by British manufacturers, for it may be assumed that it has the reasoned approval of competent men, and is not introduced simply as a talking point. To take one detail alone as an example, the fact that mechanical lubrication has been adopted should make our own designers very careful how they allow themselves to be satisfied with the retention of the hand pump as a means of lubricating their post-war engines. The hand pump certainly works, and, in the hands of a capable rider, works well, but that the method is crude cannot be denied.

An index to the advertisements in this issue will be found on the page facing the back cover.

CONCRETE ROADS AFTER THE WAR?

Will Concrete Highways eventually Supersede Tarmac?

In these days concrete is used in almost every branch of engineering. For many years we have had concrete buildings. Last year concrete played a leading part in the German defensive, and this year it is being used extensively in the Allies' shipbuilding programme. A few years ago concrete ships would have been laughed to scorn by our builders of steel and wooden vessels, but, owing to rapidity of working and durability, concrete is being recognised as a material offering great possibilities in many spheres where its use was hitherto considered impossible.

Concrete as a road-making material has been used extensively in America. both in the United States and Canada, while in Great Britain its advantages were only just being recognised when the war put a stop to road-making on a large scale. Notwithstanding, there are several stretches of road in this country constructed by enterprising county boroughs and municipalities, and the very hard service to which they have been subjected under war conditions no doubt will serve to provide valuable data for post-war development.

A Question of Engineering.

Probably it will be found that some such experiments have not justified their engineers' highest hopes, but it is claimed that where such roads have not proved satisfactory it is due to the method of laying, as the making of a concrete road is more a question of engineering than the older methods of macadamising and "darning" in vogue in this country.

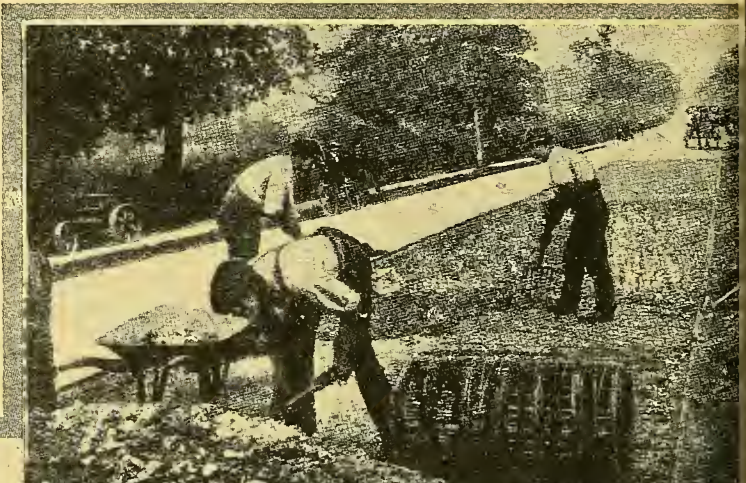
Undoubtedly roads with a smooth, unbroken surface form a matter of special interest to the motorist, and certain it is the roads which were quite satisfactory a decade ago will no longer serve the needs of the nation in the future. Therefore, if concrete roads are all that is claimed for them. it is to be hoped that scientifically constructed highways of this mate will be the rule rather than the exception in a years' time.

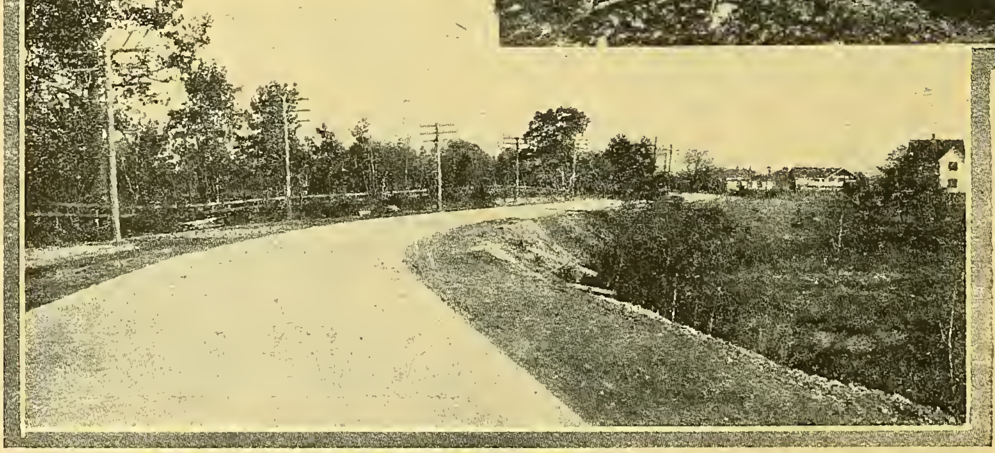
In America there are many hundreds of miles such roads, and, although subjected to climatic co tions that are not experienced in this country, are said to have proved highly satisfactory in e way for the traffic that has been run over them.

An Experiment in England.

A short time ago Redhill Road, Reigate, was built of reinforced concrete, and no doubt a re from the County Surveyor (A. Dryland, E M.I.C.E.) would be of great interest to motor The methods employed in building this road inclu the laying of a wire netting with the concrete, wh it is claimed, provides a perfect road foundation, spreads each wheel load over a very large area of under bed.

If we remember correctly, experiences with conc roads in other parts of this country have been encouraging, and should the great national highw which we are told (ex America) are to be built w the war is over, fructify, then concrete may be i for their surface.





(Top) Making a cc crete road. Strong w netting is laid in t foundation concrete.

(Bottom) A stretch concrete road America. Both U.S.A. and Canada cc crete is used extensiv in road construction.

Occasional Comments by "Ixion"

"Technical" Jobs.

F the Army intends now or in the future to enlist as D.R. privates men whose sole qualification is that they can ride a motor bicycle, it is absurd rank such ratings as "technical"; and it is common nowledge that the Service has been compelled to ain hurriedly tinkers, tailors, butchers, and bakers become "engineers in six weeks." It is absurd describe such a man as "technical"; if increasing xperience at last converts him into a pukka mechanic, e will presumably gain promotion; during the interim, is "technical" ability is imparted to him by the chool N.C.O.'s, and hardly affords a claim for extra emuneration. Many of these "army-learnt" men re only efficient so long as N.C.O.'s and officers are t hand to shepherd their efforts. Presumably the rievance now existing between "technical" lorry rivers and "non-technical" motor cyclists in the .A.F. arises from an intention to demand a far higher nechanical standard from M.T. drivers in years to ome than will be required of D.R.'s; and this policy s extremely sound. To take a single point, a lorry osts hundreds of pounds, a bicycle costs about £50. By the D.R. reasoning, a subaltern might claim the ame pay as a lieutenant-colonel; whereas the correct rinciple is that pay should be in proportion to responsibility.

How the Grievance Arises.

THE existing friction arises because the Army, like the law, does not legislate for hard cases. The simple and obvious fact is that many D.R.'s re skilled engineers, capable not only of riding a notor bicycle, but of overhauling it: possibly equal o constructing a machine, or even to designing it. The same applies to some of the M.T. drivers. But he evident R.A.F. policy is that, when things settle lown, the D.R. shall be a rider, pure and simple, whereas the M.T. man shall be an engineer. This deal has not yet developed in practice. Engineer D.R.'s find themselves rated lower and paid less than M.T. men whose motoring was limited to a penny icket on a Tilling 'bus less than six weeks ago. Hence hese tears. On the top of these anomalies, the Service suffers from a quite natural inflexibility. It is ull of "dead ends" and blind alleys. A man, gnorant of Army ways, enlists as a D.R. He turns out to be an all-round engineer, and quite exceptionally useful. The officers immediately over him value him, and do everything they can to keep him. Promotion loes not come his way, because the ranks just over his head are full, and chance to remain so. So he stays a "non-technical private," and has the mortification of seeing a rabbit trapper from his native village leveloped from this unmechanical basis into a full-blown "technical" M.T. man in six weeks, rated above himself, and paid more.

The Remedy.

I CONFESS that I cannot criticise the principle underlying the organisation. The M.T. man has more complex duties and heavier responsibilities. The M.T. men should be drawn from the more highly skilled ranks, should be given a more thorough training, and should receive more pay. Inefficiency on their part costs the nation pounds where a stupid D.R. costs the nation pennies. There is no need to quarrel about names, and even if it is a blunder to use the term "technical" somewhat arbitrarily in the mustering list, that is a mere detail. The kernel of the trouble is that it is possible for the more skilled men to be mustered for the less skilled job, and to get stuck in it. Organisation can hardly cure this. If it were open to the D.R. to submit himself for an examination as M.T. man, the case would not be mended, since a first-class motor cyclist may be hopelessly ignorant of three ton lorries; many Brooklands experts cut foolish figures the first time they tackle a Leyland. The remedy surely lies in the hands of the officers. It is an officer's business to know his men, and to promote the efficiency of his unit. I submit that the following points express the situation with tolerable justice:

(1.) In principle, lorry and car men should be rated and paid more highly than motor cyclists.

(2.) Injustices must occasionally occur.

(3.) The R.A.F. is a new force, and its organisation cannot be perfected in two months.

(4.) It is up to N.C.O.'s and subalterns not to waste good men on simple jobs.

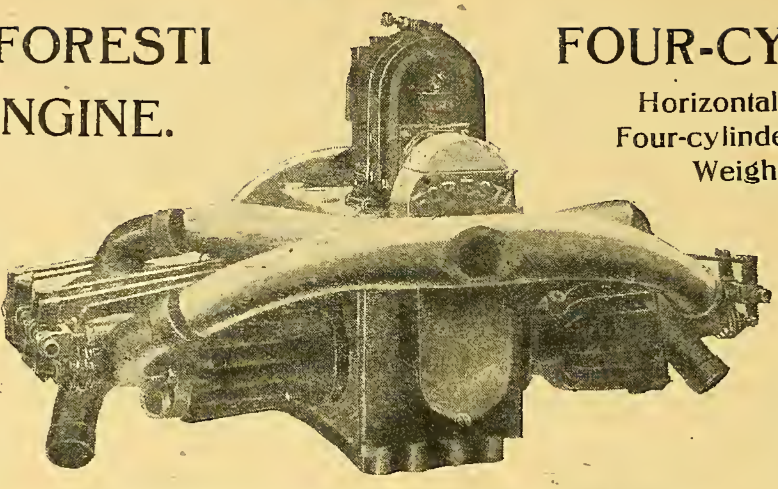
(5.) We shall all continue to do our bit to the best of our ability, even when the emergency machinery of war does not do us full personal justice.

M.T. and D.R. at the Front.

GENERALISATIONS are always perilous, and many people die without ever having grasped the difference between the average and the extreme. So I ought to guard the above reasoning from an attack which some reader is sure to make. It is by no means true that *every* M.T. man has a more responsible job than *every* D.R. For example, I know an M.T. private who is transporting fodder in Wales, and, *per contra,* I know a D.R. who practically saved a battalion by getting a message through under great difficulties and dangers in Fritz's push for Amiens. We must compare like with like. There is probably a D.R. toting round chits in Wales—match him with the fodder lorry. There is an M.T. man feeding the front guns before Amiens—match him with the Triumph under shell fire, and so on. Given the same conditions of service, the difference between the D.R. and the M.T. is parallel to the difference between a second lieutenant and a captain; in each case the latter bears the heavier responsibility.

THE FORESTI FOUR-CYLINDER FLAT ENGINE.

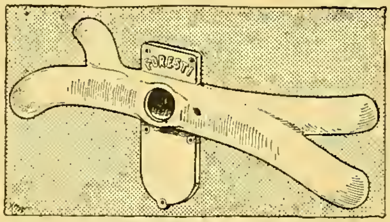
Horizontally-opposed, Four-cylinder, 700 c.c. Weight 60 lb.



The Foresti engine (700 c.c.), carburetter side, showing the neat design of the induction pipe casting.

THERE are few designers of motor cycle engines who are better qualified to turn out something possessing great originality, super-efficiency, and light weight than Signor Giulio Foresti, the dashing driver who created a great sensation in the 1913 Grand Prix on Moriando's Itala—a feat which was witnessed by a large number of motor cyclists, whose race meeting took place the following day. Foresti's car was upset just opposite the grandstand at Amiens, and by the herculean efforts of himself and his mechanic it was righted again and driven for thirteen more laps before the frame gave way.

So much for his prowess as a driver. The fact that for some years he was works manager of the Itala Works at Weybridge speaks for his qualifications as an engineer. Signor Foresti is not only an expert motor car driver, but also a keen motor cyclist, and his exceptional experience has resulted in his designing a most interesting engine. All the way through the designer has aimed at obtaining super-efficiency, and up to the present his efforts have been rewarded with no mean degree of success.

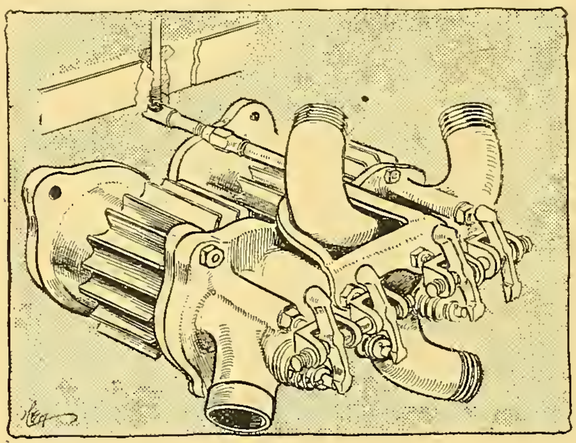


The Foresti induction pipe.

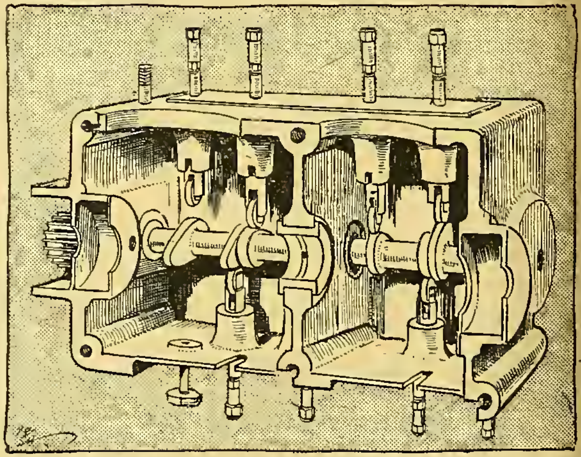
The little engine, which is a four-cylinder of the horizontally-opposed pattern, has a bore and stroke of 60 mm. × 61 mm., 700 c.c., and has developed on the bench 21 h.p., though in the ordinary course of events it would b rated at abou 6 h.p. The cylinders are provide with overhead valve situated in detachable heads, and als with horizontal cooling fins. The valve have hollow heads and are consequentl exceptionally light while the materia of which the rocke arms are made is very light steel. Considerabl ingenuity has been displayed in the method of fixin the cylinder by means of two studs and a specia fastener on one side of the crank case. This metho is shown in the accompanying sketch. It consists o a bridge clamping over the two cylinders from whicl an anchor rod runs. The lower end of this rod passe into a recess in the crank case, and one of the bolt holding the two crank case halve together passes through it. By thi means there is no chance of the bol coming adrift, as might be the cas if it were screwed straight into the aluminium. This fastening rod i provided with a long nut which ha a right and left-hand thread.

Lubrication.

The lubrication is effected b means of a vacuum pump, which keeps oil to the level of a quarter of an inch in the crank case, thence the lubrication is by splash, there being baffles to the rear cylinders so as to prevent these from receiving a excess of oil.



The method of bolting the cylinder to the crank case



The ball bearing camshaft and roller tappets of the Foresti engine.

T Foresti Four-cylinder Flat Twin.—

Some idea of the care taken to render the engine light as possible is shown by the clever way in ıich the connecting rod has been lightened, also e pistons are drilled with this end in view. The ston possesses two very light rings in the same oove, and is webbed inside so as to ensure its having nple strength.

The gudgeon pin is secured by two copper disc ngs, one each side—a very simple fitting which ccessfully anchors the gudgeon pin and prevents e possibility of any damage to the cylinder.

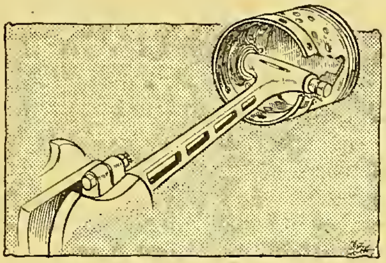
Split big ends are fitted, and the shes are of phosphor bronze, while imms are provided so that any ar in the bearings may be easily ken up. Suitable grooves with ssages are cut in both big and tle end bearings to ensure their ceiving plenty of lubricant.

An examination of the crankshaft veals the fact that it is of a simple ture and a remarkably well-made ece of work. It is of the four-row pattern, and is supported on o-double-ball bearings at each d and on a phosphor bronze bearg in the centre. The ball bearings e situated in recesses cast in the ank case. Another interesting ature in the crankshaft is that the lance weights are integral with the shaft itself, and e whole is made of one solid piece of steel, following test practice.

Cam Design.

The timing gear wheels are of very large size, so at they are entirely silent and of ample strength. he camshaft is placed immediately above the crankaft, and, like the latter, runs on ball bearings.

Signor Foresti's racing experience has been of great lue to him in the design of the cams, which follow cing car practice. The tappet rods are provided th rollers running on the cams, thus obviating ar and side thrust. The tappets are naturally of e adjustable pattern and work in phosphor bronze shes.



The Foresti piston and connecting rod. Note the manner in which both are lightened without interfering with their strength, the slot with two holes in the little end to ensure adequate lubrication of the gudgeon pins, the copper discs which hold in the gudgeon pin and the split pins of the big end bolts that prevent the nuts from moving.

One of our sketches shows the design of the induction pipe, which is part of the casting forming the cover of the timing gear case, and the particular form of induction pipe employed ensures a free passage for the gases, so that they are in no way baffled.

The care exercised in the design of this engine is demonstrated by the fact that a V piece is situated opposite the orifice leading from the carburetter, so that the mixture will be properly conducted to the various cylinders. The situation of the inlet pipe close up against the engine ensures its being always warm, and this should be of great assistance so far as carburation is concerned.

The magneto is fixed on the top of the timing gear case in such a position that it is quite accessible and may be easily detached.

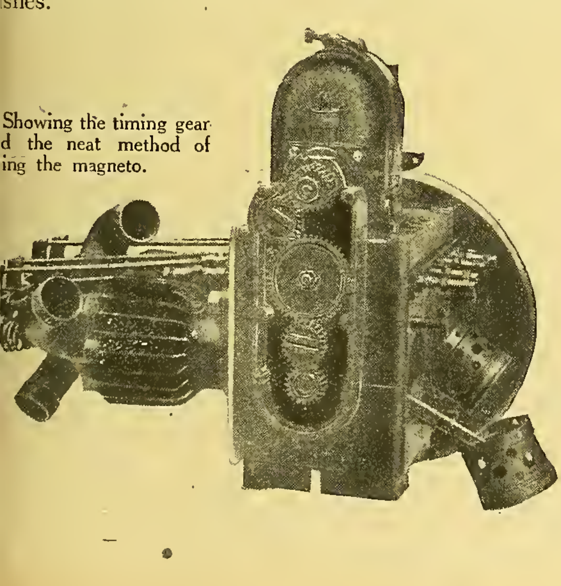
Absence of Vibration.

Another instance of the care exercised in the manufacture of this engine is the fact that a cap is screwed over the end of the flywheel bearing boss so as to make certain that the crank case is firmly secured at this point. It also ensures that the bearings are adequately protected.

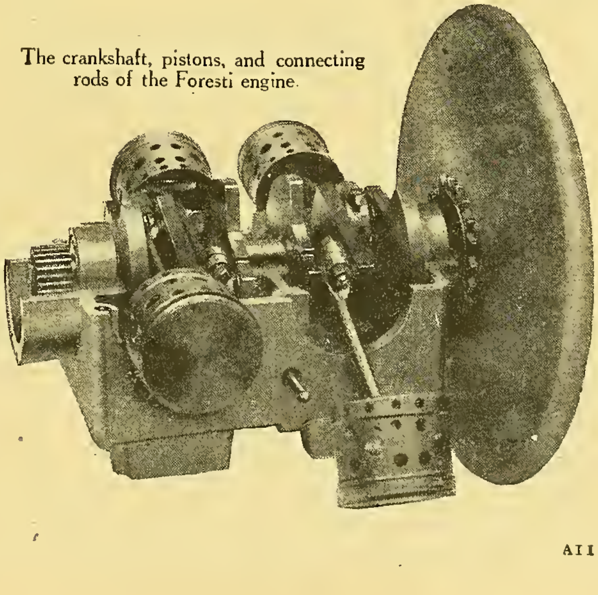
It is only natural to find that an engine of this design is beautifully balanced, and, of course, vibration is practically absent, no matter at what speed the engine runs.

After experimenting with numerous carburetters, Signor Foresti found that the greatest satisfaction was obtained from an old C.A.P., which was the prototype of the modern B.S.A. carburetter.

At the time of our visit the engine had been dismantled, but it has actually run and given great satisfaction. Though at the present time it has not been fitted into a motor cycle, when the opportunity for fixing it in a frame comes we understand that it will be fitted up very much in the same manner as is the Douglas engine in its neat and well-known cradle.



Showing the timing gear
d the neat method of
ing the magneto.



The crankshaft, pistons, and connecting rods of the Foresti engine.

SEATS OR SADDLES FOR SOLO MOUNTS?

A Reply to "Comfort in Riding" from a Rider of Much Experience.

As an old motor cyclist who has ridden machines fitted with all kinds of saddles and seats, including Brooks's bucket seat and the XL'All saddle seat, also saddles fitted with back rests, I may perhaps be allowed to say a few words on the subject of comfort, and what I consider more important, perhaps, even than comfort, viz., the safe riding and control of a motor bicycle.

Quite early in my motor cycling days, when spring forks, let alone spring frames, were practically non-existent, the makers supplied an ordinary cycle saddle with a slightly larger top, Brooks's B90 being a favoured model. Small hard blown tyres, rigid front forks, poorly balanced engines, etc., produced a considerable amount of fatigue in long-distance riding, the spinal cord being particularly affected if speed were indulged in over long distances. One of the first introductions for the rider's comfort was the back rest as in the illustration on page 406 of the issue of April 25th. This proved comparatively dangerous, because without a clutch to enable the machine to be started from rest with engine running, it was an acrobatic feat to land in the saddle by means of the running mount and to clear the back rest in doing it. The rider's position also did not enable the back rest to come into full play, for the simple reason that riders did not lean back, neither did they sit absolutely upright.

Back-supporting Straps.

I think I am right in saying that after the back rest came one or two back-supporting devices made of straps or webbing; these passed round the rider's waist and were hooked to a staple or other attachment on the top tube of the frame close to the top ball head lug. These attachments did add to the comfort of the rider, because they supported the spine in a better way than the fixed rest on the saddle cantle. The webbing or strapping did not dig into the back like the hard padding of the back rest. The drawback was that the rider was connected to the machine by a hook arrangement which was alleged to uncouple itself automatically in the event of an accident, and few cared to experiment with falls to ascertain if the device functioned correctly; these attachments were also very much in the way when dismounting and mounting, and they never became popular.

Bucket Seats.

Then came the bucket seats and the anatomical seats like the XL'All. To the best of my recollection experiments were first made by amateurs, the first I saw being made by a well-known Midland mot cyclist, who was fond of providing his machine wi other home-made appurtenances, such as tool boxe special mudguards, etc., and who very much preferr a bucket type of seat to a saddle. I remember ve well the first time I tried his machine so fitted aft coming straight from an ordinary Brooks bicyc saddle with coil springs—not the type now sold wi compensating springs and a broad seat, but a narro pedal bicycle saddle. I had been accustomed to gr the tank of the machine with my knees in the san way as a horseman grips the horse, and I found th although the bucket seat was very comfortable on roa which had shaken me about considerably when usi an ordinary saddle, the absence of the gripping contr made my position very insecure, and the first corn showed me that there was a great deal of differen between sitting nearly upright on a bucket seat ar leaning over with the tank knee grip to take corne on a single track machine.

Seats on Sidecar Outfits.

Soon after that I became possessed of a sideca and had an opportunity of trying the XL'All sadd seat. It was with some doubt as to its suitabili for motor cycle work that I fitted it, but I soon foun that the seat position on a motor cycle with sideca was a different proposition from the seat postu on a solo machine. The reduced speed and the fa that when turning corners one could not lean th bicycle over to right or left, meant that there was n longer that necessity to use the knees as a grip on th tank. With a sidecar, one can assume a more or les natural sitting position, but even with a sidecar ther is a considerable amount of roll, which to some rider makes a seat less attractive than a saddle. One als gets bumped about more, for reasons which I wil explain later.

In designing the XL'All anatomical seat, I thin the makers have endeavoured to embody the comfor of a seat with a certain amount of narrowness at th peak, which enables the grip control to be exercise within a limited degree. There is, of course, a goo deal claimed for the superior springing mechanism o this and one or two other saddle seats, but in thi article I only propose to deal with the seating position Personally, I do not think that the seat position wil ever be a success on a motor bicycle as apart fron the motor cycle and sidecar, and this is not on accoun of any inherent fault in the seat *per se* or because o the lack of control with a seat, but because the sea position destroys the flexing of the limbs by which natural springing action is obtained.

Motor Cycle Racing in New Zealand

B·S·A

Motor Bicycles

AGAIN IN FRONT!

CHRISTCHURCH RED CROSS MOTOR CYCLE CARNIVAL,
23RD FEBRUARY, 1918.

Event 1.—LIGHTWEIGHT HANDICAP:

B.S.A. FIRST and SECOND
(WOODMAN) (KARTON)

Event 4.—MIDDLEWEIGHT HANDICAP:

B.S.A. FIRST and SECOND
(WOODMAN) (KARTON)

Event 9.—OPEN HANDICAP:

B.S.A. FIRST and SECOND
(BONNINGTON) (WOODMAN)

In this event, B.S.A. 4¼ h.p. competed against 7 h.p. machines.

RELAY RACE:

WOODMAN on a B.S.A. won the Race for his Team by beating his rival by over 600 yards.

CONSOLATION EVENT:

B.S.A. FIRST and THIRD

THE BIRMINGHAM SMALL ARMS COMPANY, LTD.,
Small Heath, Birmingham.

Where the side-car scores

In these days, when we cannot do as we did in days of yore—when petrol as a power-producer is restricted to use for National requirements—

Many of us dream of "things to be"—

We have all sorts of ideas as to the future—we dream of high-powered Cars—of Aeroplanes—and of wonderful performances by Land, by Air, by Sea, but—

In the future we shall "come to Earth" again, and find in common agreement that the Sidecar Combination as a means of travel "scores" at every point and has no superior.

We are not "dreaming" when we tell you so, as we do in an interesting little folder called "The Post-War Clyno"—a folder which also gives you fullest details of our "after-war" machine—the 8 h.p. model, and tells all about our policy of MASS PRODUCTION OF ONE MODEL, and our scheme of ROTATIONAL DELIVERY of THE Sidecar Motor Cycle—the

CLYNO

1338

You will be interested, so ask us for copy.

THE CLYNO
Engineering Co.,
Pelham Street,
Wolverhampton.

ats or Saddles for Solo Mounts ?

The natural seated position is one in which the ighs are practically horizontal. Let the reader sit n a chair with feet extended forward and resting on ıe floor and hold on to some object such as a chair ack situated the same distance from the seat as the pace between the saddle and a handle-bar on an ordi-ary machine. Now let him try to use his legs and ighs—as a natural spring, and he will find that to aise his body from the seat he will require to use the ıuscles of his arms and back, and that considerable ffort will be required to lift the weight of his body. till holding the chair back, let him assume a partially rect posture, knees just bent and feet below the ody. This is the position occupied in free-wheeling n a pedal bicycle, except that one foot and crank re in advance of the other. Thus the rider's body s carried on a natural spring formed by his legs, feet, nd thighs with the pivoting point at his knees. That n my opinion is the whole secret of the difference etween a natural seated position on a bicycle and vhat I should call, for want of a better term, a cycle r free-wheeling position. On a cycle one is, so to peak, part and parcel of the machine. If it goes over mound in the road or into a depression, one is made cquainted almost automatically that a shock is oming, and one meets it by the natural spring of the rms and legs.

An Experiment.

Let anyone who rides a pedal or motor bicycle take is machine to the top of a fairly steep hill with a otoriously rough surface. Let him sit in a position, with the legs extended forward and resting on foot-ests, which will bring the feet close to the front mud-guards—that is, with legs at an angle of about 45°; e will find that in this position it is difficult to stand p on the footrests without great assistance from the nuscles of the back and arms. Now in the so-called atural position let him ride down the hill (free-wheeling down without the engine running if he likes), and let his weight rest in the saddle just as though it were on a seat or chair. Let him mentally note the shocks, and return to the top of the hill and ride down again with the legs either on the pedals with cranks fore and aft, or, if there are no pedals, on the customary footrests or anything he can rig up temporarily which will act as a footrest, and allow him to rest his weight partly on the legs or to raise himself from the saddle by merely standing up. Now free-wheel down the hill, and when the machine strikes an obstruction or bumps about let him use the natural flexing action of the legs as a spring, and note the difference in comfort and control of the machine.

If this is carefully carried out I do not think there will be any question whatever in the minds of those who make the experiment as to which is the better seat position for a motor bicycle, one with footrests in front and legs extended, or one with legs more vertical and footrests further back.

Double Footrests.

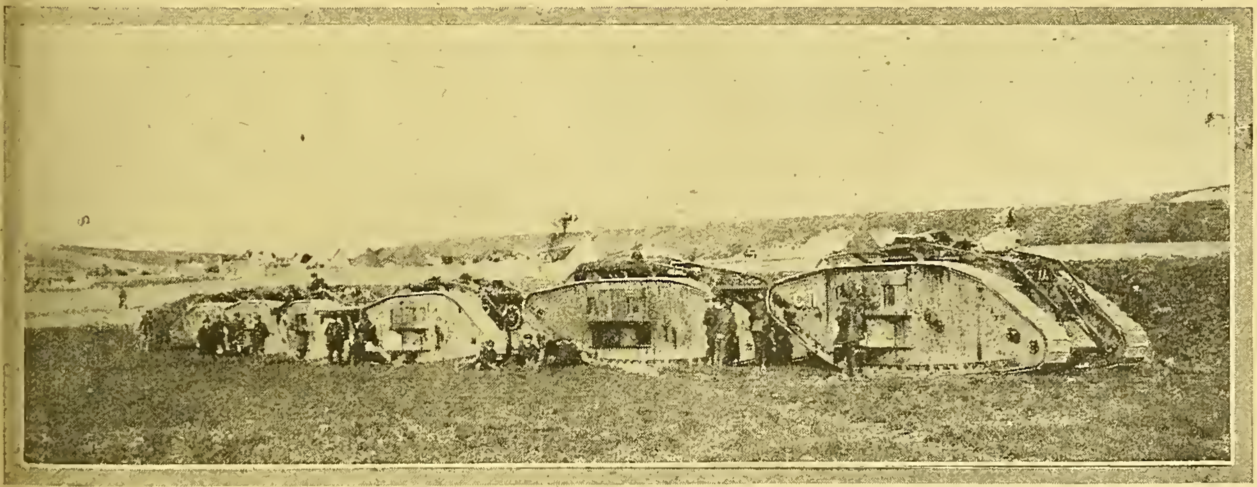
A good many readers will remember that the Rudge Co. and one or two others fitted double footrests, so that the rider could employ two different riding positions, one with legs and feet extended or with legs nearly vertical. The change of riding position was very beneficial on a long ride. When ambling along quietly on a good surface the extended position was quite comfortable, but immediately speed increased or surface quality decreased most riders of machines fitted with double rests adopted the vertical position, thus bringing their feet back to the rear rests.

Again, examine any good photograph of T.T. riders in motion. One does not see them sitting on a seat with their feet extended in a so-called natural position. The legs are usually nearly vertical, which shows that this is better for controlling a motor bicycle particularly at speed.

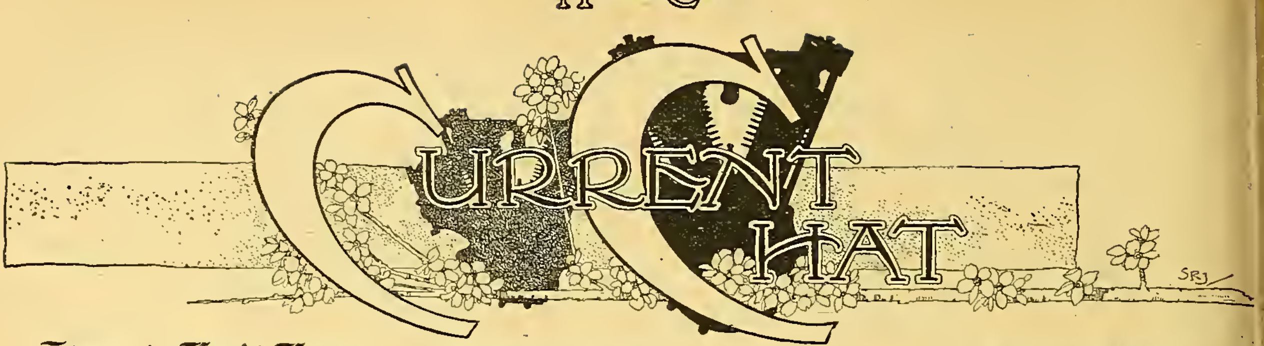
I do not, of course, wish to suggest that racing positions should be adopted for touring or ordinary riding purposes, but I think it is incorrect to argue that the seat is superior to the saddle unless it be so made as to give the rider the same leg position as the saddle, when, of course, it cannot be termed a seat.

It must be understood that the opinions expressed above refer to motor bicycles only, single track machines used solo, and not passenger machines, such as sidecars or any form of multi-wheeled vehicle where the machine will remain upright when at rest and does not require to be balanced as well as steered.

W.G.



A group of Tanks waiting orders during the German offensive on the Western Front. (*Official.*)



CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

May 9th	9.2 p.m.
,, 11th	9.5 ,,
,, 13th	9.9 ,,
,, 15th	9.12 ,,

Chief of the Penguins.

Miss Violet Douglas-Pennant, sister of Lord Penrhyn, has been appointed commandant of the Women's Royal Air Force.

Petrol after the War.

"Do not be so sure that it will be years before petrol is plentiful when the war is over," said an officer qualified to state such an opinion; "the likelihood is that the shortage of motor cycles will be felt more keenly than the lack of fuel."

Fined for dealing in War Trophies.

Leslie Barrington Taylor, a cadet holding the D.C.M., was fined £5 at Northampton for selling a pair of binoculars and a revolver to Ernest Moss, of Northampton. Moss was fined for making the purchase. Taylor stated that he took the binoculars from a German officer, but had himself purchased the revolver.

A Stolen Motor Bicycle.

In our last issue, under "Current Chat," we published a paragraph mentioning that a twin-cylinder Harley-Davidson motor bicycle had been stolen from outside the Canadian War Records Offices, 15, Tudor Street, London, E.C.4. Fortunately, the machine has now been recovered. It transpires that it is the property of Lord Beaverbrook, Minister of Information, and is used by Capt. J. S Watkins, of the Canadian War Records Office. It was left at the bottom of John Carpenter Street on a recent Saturday afternoon, when there were few people about and the streets were quite deserted. A person wheeled the machine round the corner, and attempted to start it. Now, the Harley-Davidson is fitted with a switch box which controls both the ignition and the lamps, and the switch can only be turned by means of a special key, which he could not find. With the aid of a knife, however, he managed to turn on the electric lights, and after some difficulty succeeded in getting the engine to start, and ran the machine for about twenty miles, when the accumulator ran down. The machine was then taken into a repair shop, and, owing to this fact, it was traced by the police, and eventually restored to its owner.

The Fat Pony Model.

A motor agent of our acquaintance, whose wife wishes to take up solo motor cycling after the war, intends building what he terms a special "fat pony model." The engine will be a single cylinder of about 500 c.c. with a very low compression in order that it will be as docile as the "lady's usual fat pony."

For Promoters of Post-war Competitions.

Plaster of Paris was used to seal the tanks in the economy contest held recently by the Omaha Motor Cycle Club, U.S.A. It is said that this makes an effectual seal, and eliminates any danger of fire, which always is present when sealing-wax is used.

The Institution of Automobile Engineers.

With a view to drawing attention to the advantages which the Institution offers to young men who are being trained for the profession of automobile engineering, a special meeting has been arranged at the works of Messrs. D. Napier and Sons, Acton, for Friday, May 10th, at 6.30 p.m., when a paper will be read by the president, Lt.-Col. R. K. Bagnall-Wild, on "An Examination into the Causes of Failure of Lorry Parts on War Service," followed by one by Mr. G. W. Watson, member of the council, on "Tank Engines." Cards of invitation are obtainable on application to the secretary, 28, Victoria Street, S.W.1.

Special Features.

LUBRICATION OF THE FLAT TW

INDUCTION PIPE DESIGN.

THE FUTURE AND COMMERCIA AIRCRAFT.

Belt Drive.

There are still a large number of who prefer the belt drive.

The Motor Cyclist Policeman.

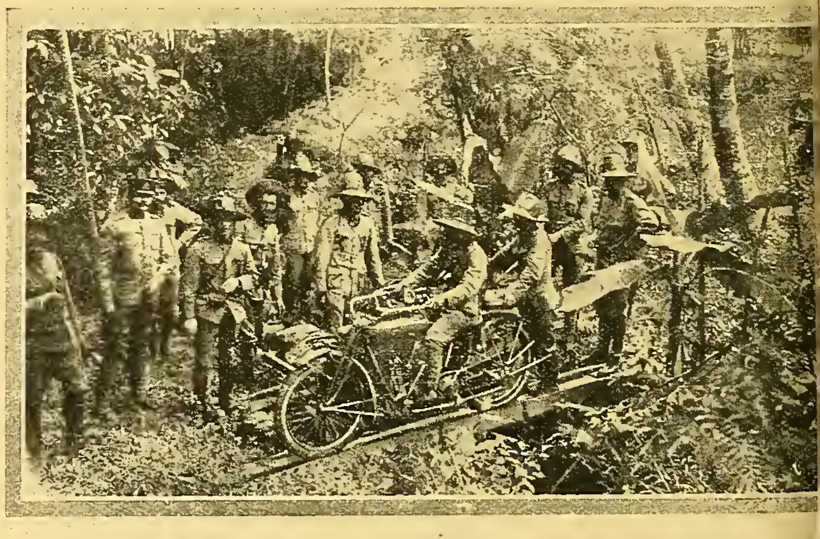
It has been suggested to us that only way to obtain the sympathy of police is to have them mounted on cycles.

Roads Improvement Association.

At the Roads Improvement Associ meeting on Thursday, April 25th, Percy Boulnois, M.Inst.C.E., was ele chairman in place of the late Mr. Ro Todd, and Mr. W. Worby Beaun M.Inst.C.E., M.I.M.E., vice-chairma

A Notable Flight.

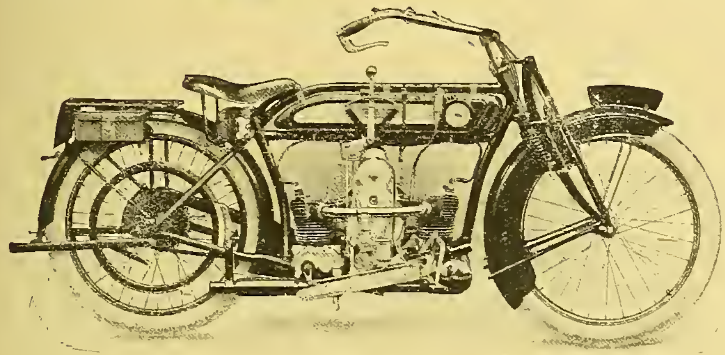
We read that, in a discussion on pluckiest flying feat on record in R.F.C. mess in France, the place honour was given to Blériot's memor flight from Calais to Dover in J 1909. The machine had never previo been in the air long enough to cross Channel, and it was uncertain whe it could maintain sufficient height alight on the cliffs.



During recent Java army manœuvres Indian motor cycles were used by despatch riders. The photograph shows some of the difficulties encountered whilst passing through the tropical jungle.

Humber

The whole of our present output is reserved for the Governments of the Allies, but may we put your name on our Waiting List?



3½ H P. TWIN HUMBER.

"We have just taken down one of your motor cycles," writes an agent in Port Elizabeth, "after doing 9,000 miles, and, except for a slight deposit of carbon, she was in prefect condition, and none of her bearings need attention. The tyres also have never been replaced, and are good for a few more thousand miles. We are circulating this against the American machines, which shake loose after 2,000 or 3,000 miles, and whose tyres rarely do more than 1,500 miles on our roads."

HUMBER LIMITED,
COVENTRY.

Economical Insurance for Motor Cyclists

PROVIDENT ACCIDENT AND GUARANTEE COMPANY, LIMITED,

FORMERLY KNOWN AS
THE PROVIDENT CLERKS' AND GENERAL GUARANTEE AND ACCIDENT CO., LTD.
ESTABLISHED 1865.

REASONABLE POLICY CONDITIONS. PROMPT SETTLEMENT OF CLAIMS.

£10 REWARD.

£10 will be paid for information which may lead to the recovery of a "Royal Enfield" 6 h.p. Combination. Registration No. MX 6681, Engine No. W 5071. Special screen and hood, Watford speedometer No. 705, 1915 make. Also the same amount will be paid for similar information leading to the recovery of a 1914/15 3½ h.p. Twin "Zenith," Engine No. 52830, mag. chain case slightly damaged. "Matchless" 8B Model, Engine No. 34572, Frame No. 3041, Regd. No. LR 3766 undertank tube cracked at head.

H.P.	PREMIUMS FOR PRIVATE USE ONLY. VALUE OF MOTOR CYCLE and SIDECAR.	
	Not Exceeding £50.	Exceeding £50.
Under 3½	£2 7 6	£2 10 0
3½	2 10 0	2 15 0
4½	2 15 0	3 0 0
5—6	3 0 0	3 10 0
7—9	3 17 6	4 7 6

15% REDUCTION IF INSURED BEARS THE FIRST £1 OF ALL CLAIMS.
25% " " " " £2 " "

Extra benefits and Personal Accident Insurance included at slightly increased premiums.

FULL PARTICULARS ON APPLICATION TO—

Head Office: 61, COLEMAN STREET, LONDON, E.C.
West End Office: 199, PICCADILLY, LONDON, W.

Telegrams—"Perpend, Ave, London." Telephone—London Wall, 5306 (4 lines).

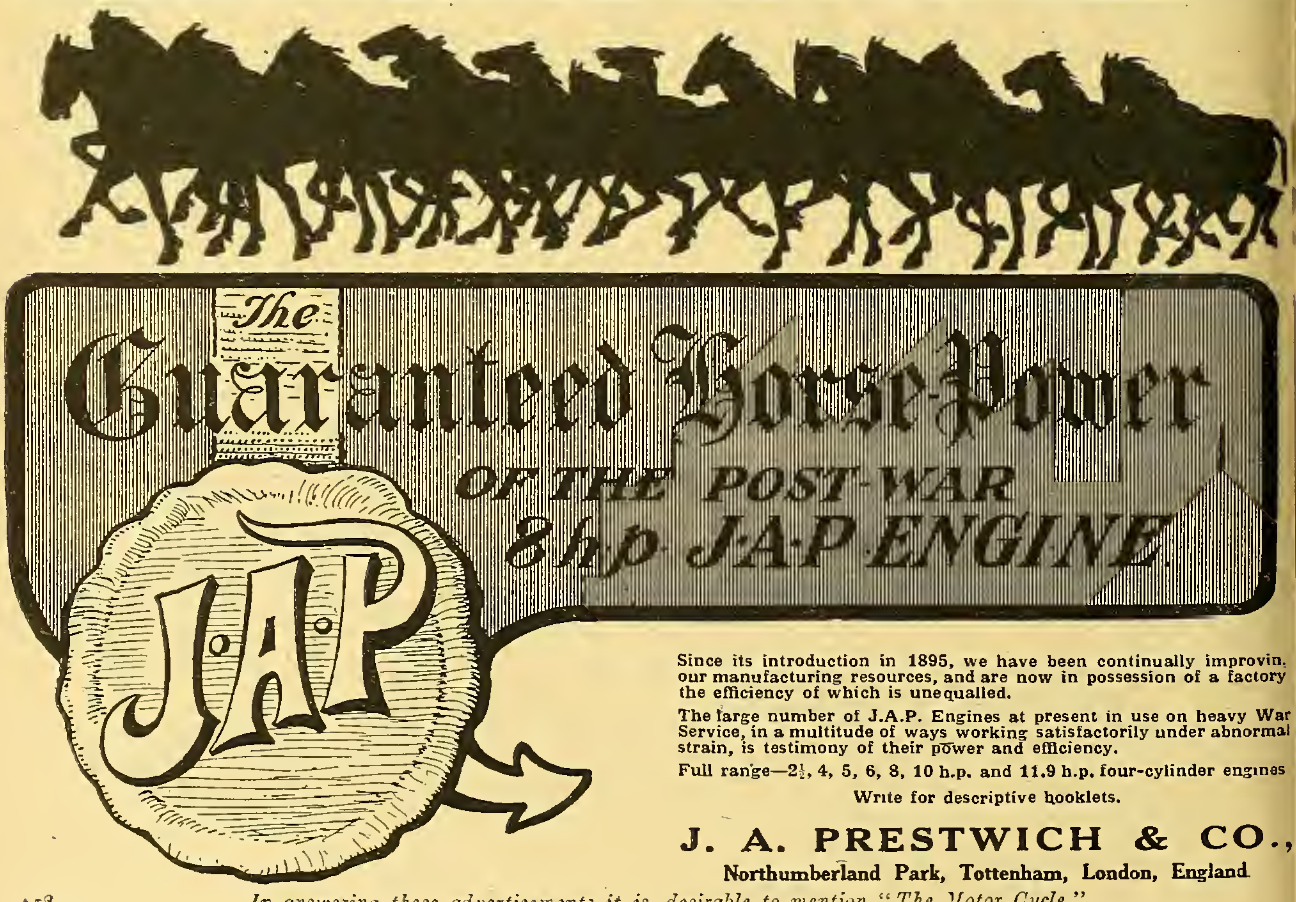
The use of this Badge is an indication that this Firm has been accepted as genuinely British by a tribunal of Trade Competitors.

At the present time **SUNBEAM MOTOR BICYCLES** can only be supplied under a Ministry of Munitions permit, but the Makers have a waiting list for those who desire to possess them at the earliest possible moment when conditions begin to become normal.

Further particulars will be sent on application to ————

John Marston, Limited, 11, Sunbeamland, Wolverhampton.

London: 57, Holborn Viaduct, E.C.1.
157 & 158, Sloane Street, S.W.1.



Since its introduction in 1895, we have been continually improvin our manufacturing resources, and are now in possession of a factory the efficiency of which is unequalled.

The large number of J.A.P. Engines at present in use on heavy War Service, in a multitude of ways working satisfactorily under abnormal strain, is testimony of their power and efficiency.

Full range—2½, 4, 5, 6, 8, 10 h.p. and 11.9 h.p. four-cylinder engines

Write for descriptive booklets.

J. A. PRESTWICH & CO.,
Northumberland Park, Tottenham, London, England

e otor Fire Tender.

T motor cycle type of vehicle is ed quite extensively in the United at by Fire Departments, and is og most efficient.

ll Bearings.

or cycle manufacturers now know o about roller bearings, and probably st-war models they will be used o extensively than in pre-war days.

sterious Engine.

recently saw what was described as the outer casing of a new type trol engine. It resembled, in both and shape, an alarum clock case. he was even a dome like the clock We have not yet guessed the riddle.

e ical Gadgets.

e advent of the combined lighting, ng, and ignition unit on the motor will begin the reign of electrical ets. Such things as electric cigar ers, handle-bar and foot warmers, control, lubrication, and gear change be as common as mascots were re the war.

ters Hill Trap Again.

e police are again timing motors at ters Hill, Blackheath, between the riding track skirting the road and the in the Sands public-house. Camou- is afforded by the converging side s. There were several motor cycle ims of the Eltham Road trap at the -end.

orts to Australia.

ccording to official figures, the following were the imports of motor cycles and s into the Commonwealth of Australia the year 1917 :

United Kingdom ...	£27,818
Belgium	110
Germany	32
U.S. America	132,248
Total	£160,208
Duty collected	£48,526

Death of M. Taride.

To those who have toured in France the name of Taride is indeed a familiar one. The Taride maps and road books are the best known in that country. The maps are excellent, being clear and accurate, while the road books give plenty of information in a most lucid manner.

This Month's Moon Chart.

We are in receipt of an excellent moon chart for the month of May got out by Mr. A. H. Midgley, of Messrs. C. A. Vandervell and Co., Ltd., Warple Way, Acton Vale, W. Since our last reference to this it has been considerably improved. The phases of the moon are more clearly indicated, and a broad white line running down the centre of the card indicates midnight. A study of this chart is of value at the present time.

Induction Pipe Design.

In the article in this issue on the question of the design of induction pipes, it is mentioned that the Henderson motor cycle is fitted with induction and exhaust manifolds cast in one. In America, induction pipes made on this principle are also obtainable ready for fitting to one's own car. It would appear that some such arrangement will be necessary for the English motor cyclist after the war.

The Modern Broncho.

Our U.S. contemporary, *Motor Cycle and Bicycle Illustrated*, publishes a photograph of a Western motor cyclist "who finds sport in roping calves." We agree with our American friends when they say: "Our idea of fun runs in other directions from chasing a fool calf around a ten-acre lot, driving a motor cycle with one hand and swinging a lariat in t'other. But even so, chasing him isn't in it for a minute, as far as excitement is concerned, as when the fool calf is roped. Then things begin to happen in large quantities, specially if the calf manages to get the rope all messed up in wheels and things, as he usually does."

The Single-geared Machine.

One sees very few single-geared machines in use at the present time, which rather shows that for utilitarian purposes, even as solo machines, some form of change speed is necessary.

A Gallon of Petrol or Five 2 lb. Loaves of Bread.

In every munition factory a Government poster reminds petrol users that the carriage of a gallon of petrol across the Atlantic involves space equivalent to that occupied by material for five 2 lb. loaves of bread.

Soulless Mechanism.

A petrolless motor cyclist in discussing lawn mowers and other garden and household machinery, described it as soulless mechanism, and cast longing glances towards his "bloodless" motor cycle in the shed.

Hoods and Screens on Single Trackers.

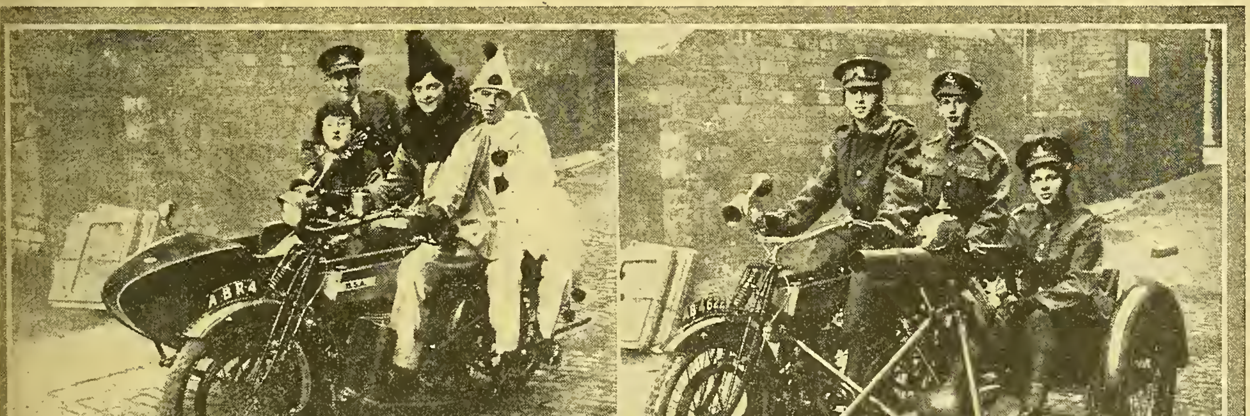
A Henderson enthusiast in America has built a canopy embodying an adjustable windscreen for his motor cycle. This cover protects the driver and his pillion passenger from rain and sun. We are not told whether side curtains are fitted for the worst weather!

Standardisation of Engine Valves.

At a recent meeting of the Society of Motor Manufacturers and Traders the question arose regarding the standardisation of valves for motor cycle, light car, and car engines. The matter was directed to be placed on the agenda, and members interested are asked to communicate with the secretary

Kingston Again!

The Kingston justices have fined a motorist 20s. under the Motor Spirit Restriction Order for use of motor spirit for taking out wounded soldiers. The defendant held a permit for the purpose, but it related to another vehicle. The Mayor said that he could not understand, if it was for the officer's health, why one vehicle should not be as good as another.

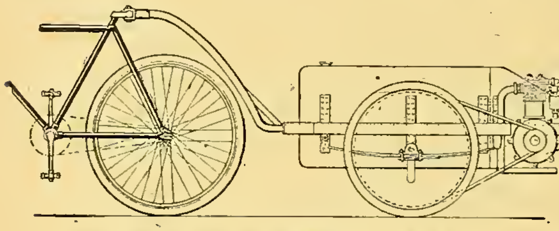


A B.S.A. sidecar and a machine gun outfit which took part in a recent Tank procession. The drivers in both photographs are lady employées of the B.S.A. Company.

A MOTOR-PROPELLED TRAILER.

A Modern Invention more Amusing than Useful.

AMERICA is not the only home of queer ideas in motor mechanics. The Continent of Europe has produced enough "contraptions" to justify at least a share of any claim. Usually, however, it is found that Europe's contributions to the world of "freaks" are old ones, and excusable because they appeared when autocars and cycles were young.



A queer patented idea for propelling a pedal cycle by means of a motor trailer.

The subject of the accompanying illustration is a recent patent of two French engineers, and, in the words of the specification, "the invention has for its object a self-propelled vehicle forming a detachable carrier capable of being fitted to the rear of a bicycle or cycle of any kind."

As will be seen from the drawing, the vehicle comprises a sprung chassis carried on two wheels, one wheel being driven by an air-cooled engine, apparently of about 3½ h.p.

We are informed that all the controls (ignition, decompressor, and braking are mentioned) are arranged conveniently for the hand of the driver, who "sits on the machine in the ordinary manner."

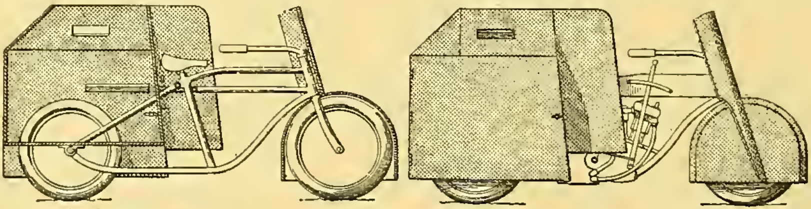
It will occur to most readers, no doubt, that, to be efficient, a change-speed gear and a clutch would be essential, and that the cost of such an outfit would be little, if any, less than that of a sidecar combination. Under these circumstances it would appear that a vehicle of this description does not justify the expenditure incurred in patenting the invention, if such it can be called.

AN ARMOURED TRICYCLE.

An American "Invention" resulting from War Fever.

WHEN the war was a novelty in 1914 and the early part of 1915 many pseudo-inventors in this country attempted to adapt the motor cycle for special purposes of warfare. An "armoured" sidecar was one of these: but as it afterwards transpired that the army grey paint covered three-ply wooden panels instead of armour steel, one could excuse the builders on the score of their publicity providing astuteness. The same excuse does not serve with the subject of the accompanying illustration: in this case we have a serious attempt to design an armoured motor cycle, for which the inventor—Mr. F. M. Goddard, of Brooklyn—has secured a patent. According to the specification, the armour consists of a steel plate protection about the vulnerable parts of the motor cycle, and a steel cab for the driver. There are portholes for rifle fire, and an enclosed steel box over the rear wheels which is intended to accommodate two passengers.

If the drawing gives any true indication of the thickness of the armour plate, we think the inventor would have difficulty in finding a motor cycle engine sufficiently large to propel the weight. In the vernacular of the land of its birth, the patent offices over there must think "it is a shame to take the money." We publish the drawings for the entertainment of those many readers of *The Motor Cycle* who know what real war means, and how useless such a contraption would be.



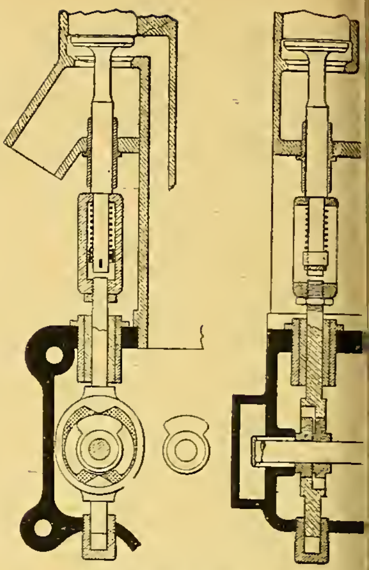
A freakish design for an armoured motor cycle that was recently patented in America.

POSITIVE VALVE OPERATION.

An Experiment of a Much Discussed Topic.

WE illustrate on this page a positive cam mechanism invented by Mr. Leonard Hinks, and capable of being applied to any four-stroke motor cycle engine. The engine of ordinary design has to open its valves against a considerable spring pressure, as well as against the pressure of gas in the cylinder (in the case of the exhaust valve). This consumes an appreciable amount of power. For example, suppose a single-cylinder motor cycle engine to be running at 2,000 r.p.m., each of its two valves opens 1,000 times per minute a distance of about ¼in. against a spring pressure of approximately 30 lb. The h.p. required for spring compression alone is $\frac{500 \times 30}{12 \times 33{,}000} = \frac{1}{26}$ h.p. roughly. Moreover, the spring pressure is the source of wear on the cam wheels, rockers, and tappet, etc.

The spring in the Hinks valve comes into action only at the moment of closing, and its objects are to ensure the absolute closing of the valves and to prevent bouncing or chatter on the seats. The barrel enclosing the valve stem is open



Sectional drawing of the Hinks positive valve mechanism.

on either side to enable the spring tc
placed in position. It will be seen
one cam wheel opens the valve
another closes it. The lift as show
somewhat abrupt, a desirable point
regards speed, but liable to cause nc
and some modification may be fo
desirable. The valve is to be te
shortly on a B.S.A. engine. There shc
be no stretched valve stems with va
operated on this principle, nor should
springs need renewal.

To Overcome the Difficulties Imposed by the Paper Shorta

□ □ □

AT the present time, owing to
shortage in the supplies of pa
for printing purposes, the product
of newspapers is beset with difficult
but by eliminating chance sales—with
consequent risk of copies remaining
sold, which leads to paper being waste
it is hoped that the weekly demand
The Motor Cycle can be met, and
regular readers supplied with copies.

TO those readers of *The Motor Cy*
who have given a definite or
to their newsagents, the publish
tender their appreciation and thanks.

TO those who have not yet done
the publishers again make th
urgent request that a definite order
placed at once.

**Please give an orde
for "The Motor Cycle" t
your Newsagent To-da**

THE MOTOR CYCLE AVIATION SECTION

The enormous importance of the Air Service needs no emphasis: it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouraging of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

When?

Ionths ago a new House Magazine of
Royal Air Force was promised, and
cash prize was offered for the best
ggested title. Is the delay due to the
ficulty in determining the winner?

◆

V.C. Airmen.

The King has been pleased to award
Victoria Cross to Lt. Alan Jerrard,
A.F., and Sec.-Lt. Alan Arnett
Leod, R.A.F., for services displaying
standing bravery.

◆

lowances for R.A.F. Uniform.

Officers of the Royal Air Force are to
vide themselves with one suit of the
v uniform without delay. To assist
cers in obtaining uniform of the
tern approved for the Royal Air
rce, a grant of £10 is to be made from
blic funds to officers who have already
eived a khaki allowance, and £30 to
val officers if they hold field rank; and
5 to naval officers up to the rank of
ptain in the R.A.F.

◆

An Extraordinary Feat.

Some of the most plucky, not to say
ir-raising, feats are done in air far
noved from the fighting areas. On one
casion at an aerodrome in England a
in-engined pusher machine was being
sted, and it was taken into the air with
e fore and aft trim so bad that the pilot
und it impossible to come down to earth
ain without risking an almost certain
ash. To put matters right a mechanic
o occupied the rear seat got out on to
e fuselage and crawled along it between
e two screws, which can only have
ssed him by a few inches. He then
mbed over the pilot and got into the
nt seat, the alteration in weight dis-
sition being such that the machine was
t to earth safely. On more than one occasion observers at the Front have enabled aeroplanes to get down safely, when part of the wings had been shot away, by getting right out on the opposite plane and so "trimming the ship." And this in a relative wind of anything up to 100 m.p.h. Compared to this sort of work, squirrels on top branches and chamois on the brinks of precipices have cushy jobs indeed.

◆

AIRMEN MOTOR CYCLISTS

The Rev. R. M. Bankes-Jones, curate of Sunningdale, Berks, was, prior to the war, an enthusiastic motor cyclist, and a frequent contributor of touring articles to *The Motor Cycle.* His series of articles dealing with tours in "Lorna Doone Country" will doubtless be remembered by many of our readers. Having spent some time at the Front as an Army Chaplain, he became possessed of a desire to join a combatant unit, and accordingly relinquished his chaplaincy so that he might train as an R.F.C. pilot, and in his activities we wish him the best of luck.

Sec.-Lt. (the Rev.) R. M. Bankes-Jones.

A Royal Souvenir.

From a Surrey aero engine works that he visited recently the King took away a cylinder from a damaged engine as a souvenir.

◆

"Spars."

In the light of the various resignations among leading officials of the R.A.F., "Spars" would seem to be a suitable title for the new House Magazine of the third arm of the Service.

◆

The "Brass Hats."

The Strand almost glitters these days with "brass hats"—now worn by R.A.F. officers of field rank. Lieutenant-Commanders of the R.N.V.R. have been given the rank of major, which accounts for so many gold leaves.

◆

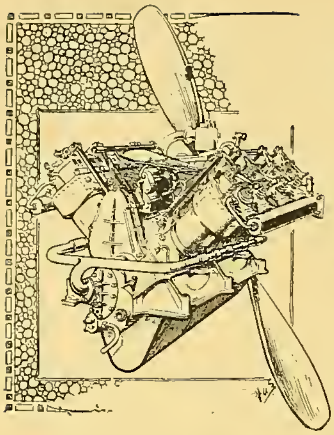
Director General Wanted.

The Aircraft Production Department is now located at its new home in Kingsway. At the moment of writing the department is without a Director General in consequence of Sir William Weir's appointment as Secretary of State to the Royal Air Force.

◆

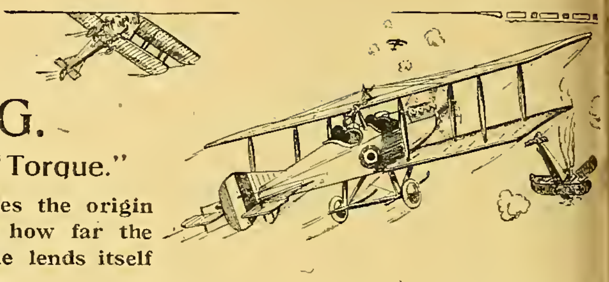
Dodging Howitzer Shells.

Several people have expressed a wonder that with the air over the lines constantly full of flying howitzer shells, aeroplanes do not occasionally run into them. They do; and it speaks volumes for British aeroplane construction that in several cases the unfortunate occupants of an aeroplane which has stopped a shell have been able to get home and tell the tale. Not very long ago a reconnaissance machine was landed at its aerodrome with two of its four fuselage booms knocked out by a direct hit from a big howitzer shell, which killed the observer and left but little of his cockpit intact.



STUNT FLYING.

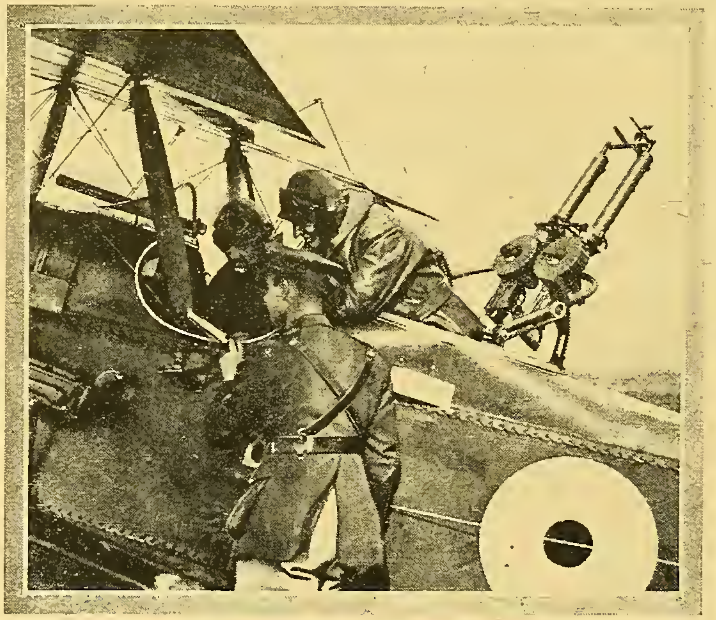
Part II. By "Torque."



Our contributor examines the origin of "stunts," and shows how far the structure of the aeroplane lends itself to trick flying.

At least two of the commonest tricks employed by fighting pilots were never invented at all. Just as Fritz cannot help being the unspeakable Boche, so no aeroplane is proof against slides and spins when due occasion arises. If a 'bus is overbanked in turning, it may or must develop a wing slide, varying in intensity according to the speed, angle, etc. If a machine is made to climb at too steep an angle, it will "konk" out as a baby two-stroke would if driven at Tornapress: only in this case the failure takes the form of a tail slide. Similarly, if an aeroplane is put into a very sharp descending turn, that turn will develop into a corkscrew or spin, unless the controls are operated; and, for reasons to be explained in another article, the primitive aeroplane usually kept on spinning when it once started. Indeed, a book published since this war broke out announced that no pilot had ever got into a spinning nose dive and lived to say what it felt like. Some of the simpler "stunts" were originally not so much invented as experienced: and the pioneers in these particular lines usually had no chance to discuss their sensations with anybody but the angels.

As time went on, an odd pilot or two managed to wrench his machine out of an involuntary stunt. When he came down, and got his breath back, and his pulse slowed down, he reasoned the matter out. A very daring man would go up again, provoke a repetition of the stunt, and test his theory as to the proper remedy. If he was right he had added a fresh trick to his *repertoire;* if he was wrong, he donned a pair of wings which are less coveted by most people than the blue and white chest mark of the R.A.F. pilot. Meantime, designers were doing their bit. In the course of time a situation which had once mea sudden death deteriorated into pure "swank," a when war broke out became embedded in our stere typed fighting tactics.



THE GERMAN OFFENSIVE ON THE WESTERN FRONT.

Pilots bring in their reports as to the position of the enemy. Note the machine guns fixed at the rear of the pilot's seat.

How the Loop Stunt was Invented.

Other stunts were the invention of genius, notab the loop. Pégoud, the renowned French crack, co ceived the idea of looping long before he had a chan to make experiments. When a machine is the rig way up the principal load comes on the "flying wires, which are very strong and run in duplicat Luckily Pégoud knew too much to try a loop tl instant the notion came to him, for when a machine upside down the principal load comes on the "lan ing" wires, which were designed in those days to c little more than carry the weight of the planes whi the machine squats st tionary on the aer drome. So Pégou asked Blériot to buil a special 'bus, stiffene to fly belly upwards Blériot refused wit oaths, so to speak finally he complied, an Pégoud looped hun dreds of loops. Th value of his stunt wa not recognised at th time. He was re garded as a cross be tween an advertisin agent and a music hal mountebank, plus the slight added glamou due to the enormous risks he appeared to be running. Now we can honour Pégoud at his true worth. He takes his stand with the man who invented creeping barages, or the testudo of the Roman legionaries, or the Macedonian phalanx, or any other special tactic which has revolutionised warfare for a space.

Nowadays, the catalogue of major stunts is probably full. It does not seem likely that any fresh manœuvres as distinctive as the loop remain to be invented. This is a daring statement, but the fact that many thousands of scatter-brained young dare-

tunt Flying.

devils are sighing in vain for new tricks to conquer, makes it doubtful whether many wholly novel dodges can be unearthed, or deskied, or whatever the appropriate term is. Minor stunts keep occurring to somebody, such as the Immelmann turn, which is simply a combination between a half-loop and a vertical bank.

The Question of Stability.

This rapid exhaustion of the list of conceivable stunts was inevitable as soon as a pilot could try a new stunt without paying the penalty with his life: and it is a remarkable fact that stunts are possible because a modern aeroplane possesses enormous automatic stability, which stability can be converted into hopeless instability by a slight movement of the hand and as rapidly restored. This is not the place to insert an essay on stability: but, briefly, the early Wright biplane was being corrected by the pilot for balance in one direction or another during almost every second that it flew. It was practically devoid of any natural or automatic stability whatsoever. As a mule is perpetually seeking a chance to kick its driver's brains out, so was the Wright aeroplane eternally seeking how it might destroy its pilot. By contrast such a machine as the BE2C can almost be flown by a sack of potatoes. In nice weather one might put a Teddy Bear in its cockpit, open the throttle, remove the chocks, and lo! the BE2C would rise aloft, fly till its petrol tank was empty, and then glide safely to earth, supposing it had the luck to alight on a nice piece of turf, and not in a graveyard among the tombstones. In other words, a stable modern aeroplane cannot give a lurch in one direction without bringing into action some surface which automatically tilts it back on to its correct path. Consequently the pilot who wishes to stunt needs but three things, viz.:

(1.) A cool head.
(2.) Sufficient altitude.
(3.) A tolerably stable machine.

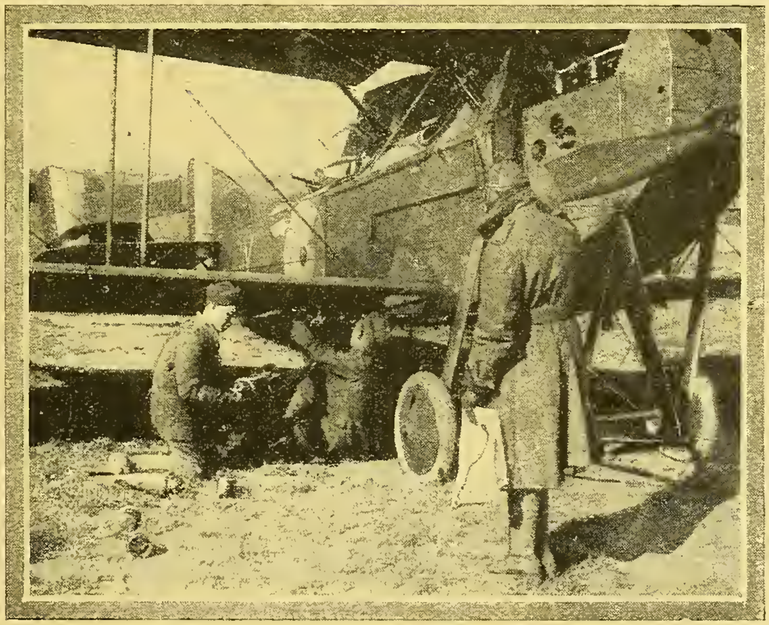
Let the Plane Right Itself.

The proof of this assertion is that many living pilots have actually looped the loop during their first solo flight! Let me explain. The cool head is necessary, because the unskilful pilot must not try to right a stunting aeroplane—he must let it right itself. If he throttles down his engine, so that its thrust becomes negligible; if he puts all his controls in neutral, leaving the automatic stability to right the aeroplane, while he sits idle and tries not to get the wind up, the machine will sooner or later put itself into a natural angle glide. He can then flatten out into horizontal flight, or land, as the mood takes him. The lateral stability factors will ultimately bring the machine on to a level keel: and the fact that it is nose-heavy when the engine is not thrusting will ensure the glide.

Since these processes take time, a certain amount of altitude is essential. Any good modern aeroplane will automatically get itself out of a side-slip, or a tail-slide, or any other frightful-looking situation, if there is sufficient room beneath it: but the job may involve a drop of 1,000 feet or more. Consequently stunting at altitudes is always safe: stunting near ground level is always dangerous, though crack pilots can do it and live.

A Cross between a Bath-chair and a T.T. Racer.

To conclude, we must explain one apparent paradox of which these notes will be accused. The natural stability of modern aeroplanes has been justly emphasised: and yet this alleged stable machine can make its wing-tips chase each other so fast that the machine almost looks like a blur against the sky. How can this weird "manœuvrability" be termed "stability"? The answer is simple. The stability is there, right enough, as long as the control surfaces are left in "neutral"—*i.e.*, ailerons lying out as continuations of the wings, rudder central, and elevators in line with the camber of the tailplane—the machine is tremendously stable. When the pilot has traced out a path which, if charted, would resemble an eel having an epileptic fit in three pounds of Berlin wool, he just centralises his controls, and the machine rights itself infallibly after quite a short drop. The instability is also there. The controls of a scout machine, designed for crazy manœuvre, are of enormous area compared to the total lifting surface. It is like a racing car equipped with the steering lock of a taxicab. The instant the giant controls are operated the stability is wiped out by their leverage: the instant they are neutralised the natural stability is restored. The fighting scout is a hybrid between a bath-chair and a T.T. racer.

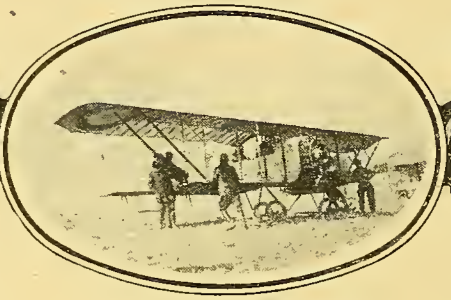


ON THE WESTERN FRONT.

Fixing bombs to drop on massed German troops. (*Official.*)

THE FUTURE AND COMMERCIAL AIRCRAFT.

The Possibilities of employing Aircraft for Regular Passenger Service.



BY A R.A.F. OFFICER.

EVERY now and then we are regaled in the daily press with more or less imaginative descriptions of flying when peace reigns once more. Delicious vistas of breakfast in London, lunch in Paris, and dinner on the Riviera unroll before us. No longer are squeamish stomachs to recoil at Channel crossings—no longer the struggle and confusion at the railway stations—nothing but the limitless air to surround one. A glorious vision, but how many of us will ever see it happening or still more ever experience the like?

If peace reigned now it would be possible for anyone who cared to pay the bill to do the trip thus defined in one of the present day war planes. It is not the possibility that is in doubt, but the question whether anyone wants to carry out such excursions. When one reads of daily journeys by air being established after the war between London and Paris, one is apt to forget that a pretty regular service of planes is now, and has been for a long time, running between the two capitals. But, as things are, the journey is very uncomfortable—tiring for the pilot and cold and cramping for the passengers.

Thus, in order to decide how aviation may be commercialised after the war, it is necessary to consider what manner of machine may be likely to be used most extensively. At present it is often said that aircraft have been perfected by the war. Rather may it be said that the war has been perfected by aircraft The present-day machine is built purely from a military standpoint, and, broadly speaking, embodies as much engine and as little aeroplane as may usefully be employed. All this must be changed when peace comes. The situation is analogous with the early history of motor car touring. Huge engines and little cramped bodies rapidly gave way to small engines and commodious accommodation. So must it be with aircraft. The first necessity of any peace-time development is to make that development pay, and there can be no doubt that all aircraft as we now know it—even of the Zeppelin type—must be vastly modified before aviation can possibly become a commercial proposition. Probably some wild-cat enterprises will be rushed on a credulous public directly hostilities cease, but few of these are likely to bear the light of skilled criticism.

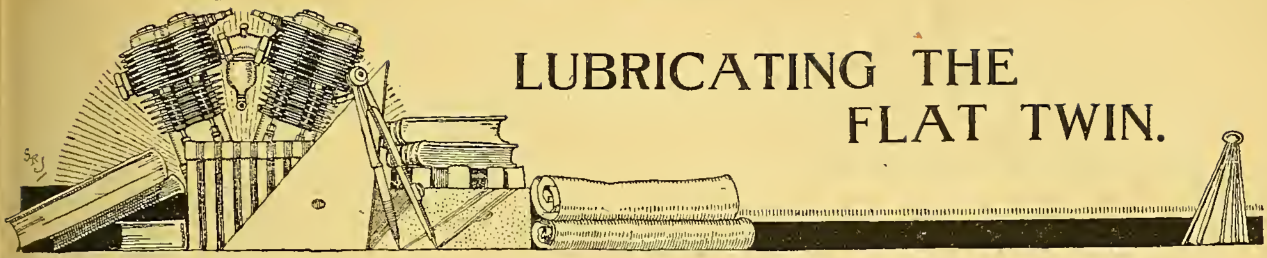
Safety of Primary Importance.

In the opinion of the writer, who has had some considerable opportunities for close observation of several types ot war planes, the peace-time passenger - carrying plane will be very much removed from the present conception of most aeroplanes. The primary importance of safety must be studied if flying is to be accepted by the many-headed. At present safety is dependent on two main factors—reliability of the engine and skill of the pilot. Engines must be improved and duplicated, and probably some means of direct lift will have to be embodied as a means towards greater safety, and also as a means of improving the gliding angle and rising angle. This will be necessary in order to reduce the size of the aerodromes. To ensure quick transit from the public service dromes to the adjoining cities the landing places must be close to the centres of the cities, with the inevitable result that the land will be dear and economy in space imperative. For it must be remembered that reasonable cost is essential if aerial travel is to be common, otherwise the railways and motor omnibuses will continue their monopolies of passenger carrying unchallenged. For the only *real* advantage of aerial travel will be speed. It is difficult to see any very immediate future for aerial traffic in goods, and thus that high revenue now enjoyed by the railways is unlikely to be challenged seriously by aerial cars.

Goods Traffic.

It is the goods traffic revenue that permits a penny a mile fare for passengers on railways, and thus it will be seen at once that, in order to stand a reasonable chance of success with nothing but passengers and perhaps very light goods as customers, it will be necessary for any aerial navigation company to study every penny of expenditure. Probably the greatest saving to be effected will be in reduction of land charges, and this leads the writer to believe that direct lift—one of the greatest revolutions ever likely to be effected in aircraft, for it means the possibility of hovering stationary—will be brought about through financial considerations: a factor which generally acts with greater force than any other agency in the realms of invention.

As regards the type of aerofoil likely to survive, in all probability the flying boat type has an enormous field for development before it. Prophecy is notoriously rash, but, all things considered, the writer suggests the flying boat, equipped with a combination land and water carriage, as the type along which commercial aerial navigating craft is likely to be developed.



LUBRICATING THE FLAT TWIN.

Some Suggestions for Overcoming a Common Weakness.

THERE is one almost inherent drawback in horizontally-opposed twin motor cycles which undoubtedly stands in the way of their universal popularity. The man who is accustomed to the breed and knows their little ways is not much concerned by this fault, but ask the rider with but a smattering of experience—ask the man who knows them only by hearsay—and the invariable opinion is, "The oiling is such a beastly nuisance."

It must be admitted that one well-known make is fairly good in this respect, but with the majority of flat twins the lubrication is too ticklish for the ordinary amateur who employs hit or miss principles. The least indiscretion at once leads to a smoky exhaust and plug troubles, and the majority of flat twins being high-revving engines, the novice seeks safety in erring in the direction of liberality. As a matter of fact, if the engine has big-end roller bearings, the oil supply can safely be cut down to a very small allowance without risk, but the art of handling an imperfect system of lubrication to a nicety is an art in itself, which can only be acquired by troublesome experience.

Plugs and Lubrication.

I am convinced that there are scores of riders who eschew flat twins simply because they are afraid of the oiling. Unless one runs the engine rather on the dry side, one can count on having to fit at least one new plug per month. The plug is apparently perfect in every way, yet nothing will induce it to behave in a decent manner. Probably it has been carefully cleaned at the roadside on several occasions, but the constant saturations of oil appear, in some way, to destroy the properties of the insulating material, so that the spark is intermittently weak and strong, or probably disappears entirely at irregular intervals. No doubt the users of petrol two-strokes have experienced similar troubles.

Given a perfect lubrication system, plug troubles will no longer be so intimately associated with the flat twin engine. Practically all plug troubles have lubrication at their root, and the common defect in flat twin engines is that the faintest overdose at once flies to the head of the rear cylinder, and staggering, etc., begins.

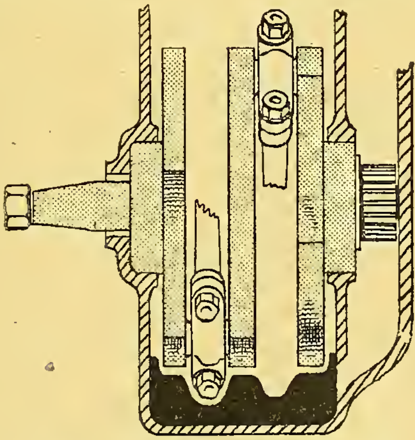


Fig. 1.—There is a theory that at high speeds the oil tends to retain the contours formed by the passage of the crank and connecting rod ends through its surface. The higher the speed the less oil thrown up.

The cause of this state of affairs is pretty obvious—splash feed. If we are to equalise the lubrication of both cylinders then the cranks must not dip at all. Obviously, if they do, the bulk of the oil is flung into the back cylinder, and by the time the front cylinder crank is at the top it is pretty well dry, so that the front cylinder receives not one-tenth of the supply received by the back. It is doubtful, indeed, whether it receives any at all by means of splash, but rather it is fed on oil vapour.

The Question of Oil Level.

Splash feed, therefore, may be all right for vertical singles, but even when the cylinders are set at 45° its inequality of distribution begins to show. Thereafter, the wider the angle of the cylinders, the more uneven the distribution. With a 90° twin the limitation of the splash system is more than reached, and with an opposed twin it may be described as a hopeless proposition. One can fit baffles or do what one chooses to prevent the excess reaching the rear cylinder, but without effect. Immediately the cranks begin to dip a veritable deluge is cast directly into the rear, whereas the front remains practically as usual. Obviously, baffles are of little use under such conditions.

It is assumed, of course, that the oil in the crank case retains something in the way of a level. I have many times heard practical riders and manufacturers say that the oil level theory is merely a myth—that when the engine is running the oil in the crank case is simply a churned up fog, and that there is no level.

This is probably an entirely incorrect idea. The very fact that in a twin-cylinder engine more oil is thrown into one cylinder than the other surely proves conclusively that there must be something in the way of a level. That the crank case is filled with a heavy oil fog cannot be doubted, but this does not exclude the level idea. What probably—one might almost say obviously—happens is that the surface of the oil forms itself into an exact contour of the disturbed area, as shown in the accompanying sketch, which is a section through the crank case parallel to the main shaft. The higher the speed the more perfectly is this contour retained, and therefore the less the oil flicked into the cylinder at each revolution. As the speed falls, the oil has longer between each assault

Lubricating the Flat Twin.—

of the crank to assume its natural evenness of surface, and therefore more oil has to be displaced when the big end and crank descend and strike it.

The greater the mass of oil in the crank case the more forcibly it strives to retain a level surface, and of course the thinner the oil is the better it succeeds in doing so. This is why an oil which is stiff by nature, or stiff because the engine is not yet properly warmed, is less likely to cause trouble than a thin oil. It assumes its contour and sticks there, the cranks displacing very little at each throw.

It may be taken that the small amount of air imprisoned in the crank case is capable of consuming only a given quantity of oil fog or vapour. When the point of saturation is reached the surplus oil is flung about in solid chunks, and it is these solid chunks that cause the trouble.

Big End Bearings.

One word now concerning big end bearings. It will be seen from the foregoing that the higher the engine speed the smaller is the amount of oil that actually comes in contact with the big ends. Similarly, the higher the speed the greater the centrifugal force tending to throw off what little oil is really successful in reaching them, and this is why so much trouble is experienced with big end bearings in racing engines. The crank case can be kept so full of oil that the cylinders are flooded, yet owing to the conditions described the big ends contrive to run dry. This, then, goes to prove that splash feed is further a defective system so far as big end bearings are concerned, and these bearings, to be properly supplied, must be fed through the hollow crank, in which case centrifugal force assists the oil to reach them in a constant flow, rather than hinders it from doing so.

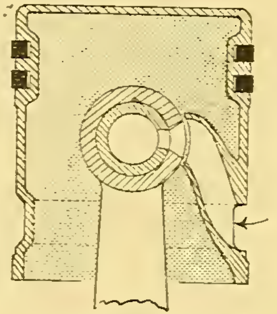


Fig. 2.—This piston has a circumferential oil groove which comes opposite the oil feed pipe at the bottom of each stroke: a lead is taken inside to the gudgeon pin.

The above, however, refers only to plain bearing big ends. If rollers are used, it is entirely unnecessary to make any provision whatever for oiling them. Roller bearings require so little oil that the oil fog alone fully satisfies their needs, and if the pistons and cylinders would stand it, a roller bearing engine might safely be run on one charge per 1,000 miles. My idea is to employ the same principle, as in the A.B.C., with regard to threading on the roller big ends.

Hot Oil.

The foregoing, then, has as its purpose the proof that the very necessary step for the improvement in flat twins is in the oil system, and in order to improve this manufacturers must get clean away from their old friend splash feed. It has served well with the single, and fairly well with the 60° twin, but the latter marks its limit as a successful system. We must do away with the oil sump entirely, and, rather than depend upon splash, we must attempt to eliminate it—that is, the cranks and big ends must not dip. The oil must be conveyed to the desired spots at the desired rate, there do its work, and drain quietly away—possibly to be recirculated. This system of distributing oil is, of course, adopted with entire success on rotary and many other complicated engines, and there is no reason why it should not prove more successful in the case of the comparatively simple motor cycle engine.

Obviously a circulating pump is necessary, and it need hardly be pointed out that the principle of keeping a large quantity of cold oil freely circulating is infinitely superior to that of leaving the engine to depend upon a little imprisoned oil. In the latter system, in general use to-day, the small amount of imprisoned oil becomes so hot that its lubricating qualities are seriously interfered with, and it is little better than so much paraffin; then, when a fresh charge is fed, its beneficial effect is but momentary, for in two minutes it is diluted with the rest, and the state of affairs gradually gets worse as time proceeds. Thus for ninety-nine per cent. of the time the engine is dependent on hot, thin oil, lacking substance and retaining heat instead of absorbing it; obviously a system feeding a cool, fresh flow all the time would be much preferable.

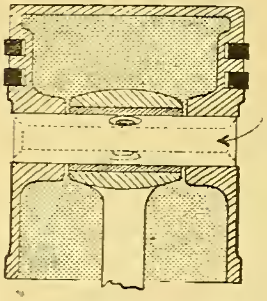


Fig. 3.—A hollow gudgeon pin having countersunk ends and drilled for lubrication of the little end.

Feeding the Small End.

The separate oil tank, occupying part of the space that might profitably be occupied by petrol, will soon become extinct—"and a good job too," as George Robey says. We do not want oil taps and oil pipes and oil pumps distributed here and there, collecting dust, liable to injury, and adding to the general ugliness of things. Permit us to keep our tanks as dry and clean as possible, and let us have no more pipes and taps than are absolutely necessary. There is a proper place to carry the oil and only one proper place—inside the aluminium casting of the crank case—Douglas and Velocette practice. The excellence of this idea is too obvious to need enlarging upon. It is clean, simple, and as things should be, and once having poured a quart into the crank case, we shall be all the happier if we are at liberty to forget all about it for a few hundred miles, as one is at liberty to do with the 3 h.p. Enfield and the Velocette—it being taken, of course, that we have a finely threaded adjustment screw to allow for variations in temperature.

Assuming that we have roller big ends and crank case bearings, the only points to which oil need be led are the pistons and the gudgeon pins, the latter presenting the greater difficulty. A simple method would be to force oil to the piston, and thence convey it by means of a lead to the gudgeon pin bearing (fig. 2). Another way would be to use a piston shaped as shown in fig. 3, having a wide oil-retaining groove, through which the gudgeon pin passed. A hollow gudgeon pin, drilled to lubricate the small end, could then be employed. Yet another way, and perhaps the simplest bricating the Flat Twin.—

f all, would be to have the gudgeon pin a driving t into the connecting rod with bushes in the piston self, and lubricated directly from the piston walls.

All these systems would convey plenty of oil to he little end on account of the fact that on one side here would be what pressure was created by any light escape past the rings, while on the other side ould be crank case suction.

Oiling the Piston.

Any gas that gets past the two top rings may be ritten off as a dead loss, and therefore having made his provision, we are at liberty to design the remainder f the piston in accordance with our oiling system. We are aiming now at a system which feeds a goodly supply to the piston—a constant flow of fresh oil which will not only lubricate but also cool. This given, it will be sufficient for all speeds and all conditions—practically eliminating the necessity for adjustment—so long as we make provision not only for getting the oil there but also for getting it away. We must, therefore, allow it to escape freely, and the obvious course is to use a slightly waisted piston drilled round its skirt. It should not be too freely drilled, however, for whereas in ordinary practice one object of drilling a piston is to enable the oil to reach the cylinder walls from the inside of the crank case, in this case the object is to enable the oil to reach the inside of the crank case from the cylinder walls. Having a drilled piston the small end would probably receive a copious supply, even though no other provision were made for oiling it.

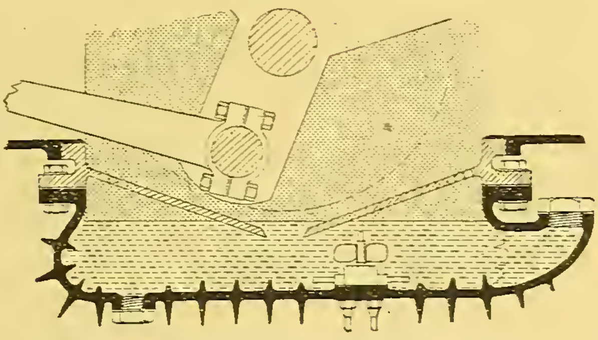


Fig. 4.—Suggested design of crank case with false floor and oil sump below containing a pump immersed in the oil. The whole sump can be detached with the pump *in situ*. The pump is equipped with a small fan or propeller to keep the oil moving.

The reader may ask, "What happens if the pump strikes work?" What happens if the pump of a rotary strikes work a few miles behind the Hun lines? There is no earthly reason why the pump should strike work, or at any rate present-day pumps do not do it. In over 10,000 miles with mechanical pumps, some of them of the experimental variety, I have known them to do all sorts of whimsical things, but never to strike work.

I think that if provision were made to allow the oil to escape freely from the piston, it would not reach the combustion head in excessive quantities, provided, of course, that the cylinders and pistons retain their rotundity, and if they do not, trouble will ensue with any variety of oiling. With splash lubrication, oil is likely to get past the rings because the deluge of oil flung up against the inside of the piston is so terrific, when an overdose is admitted, that it exceeds all comparison with the most excessive supply that would be fed to the cylinder walls.

A Suggested System.

The general idea roughly planned out in diagrammatic form is fairly obvious without description. The oil sump is situated beneath the crank case, which forms, as it were, a false floor, more or less conical in shape, and having a single drawhole at its bottom extremity. This position would detract somewhat from the crank case clearance, but since it may be taken that the bottom of the flywheel will still be the lowest point of the engine this does not matter much. The sump is provided with cooling fins to keep the oil at a low temperature, and it contains, below the oil level, a worm-driven pump for feeding the supply to the respective cylinders, thus eliminating the use of outside fittings, which accumulate dirt and are susceptible to damage. The supply to each cylinder would be adjustable, and the sump can be detached bodily, with the pump *in situ* and readily accessible.

The Sump.

The drive to the pump would not extend, of course, outside the crank case, and the oil from each of the cylinders would drain immediately back into the sump when it had done its work. It would be impossible for oil to drain into the cylinders with the engine standing, and therefore no tap of any kind would be required.

In this we have a positive system, which may be taken as preferable to one depending upon that uncertain quantity, crank case suction.

Temperature.

In present day systems oil should be fed in accordance with the throttle opening, but with the system just suggested this would not be necessary. It is necessary in present day systems, because the oil between the cylinder walls and the piston is always at so high a temperature that any sudden increase in the temperature caused by the opening of the throttle at once reduces the imprisoned oil to a state whereby it no longer lubricates, with the result that what is known as "drying up" sets in. If the oil round the piston were constantly changing, and free to escape immediately it became heated—if the piston were so shaped as to retain a rather larger supply, and provision were made to be dead certain of it getting there—then we could pour oil through pretty well as fast as we liked, removing the possibility of drying up, and still without the common nuisances that result from over-oiling. These nuisances are to-day present, because the oil not only gets there, but continues to get there, while no provision is made for it to get away. Make this provision, and one can "over-oil" to one's heart's content without experiencing the troubles which are inseparable from such a procedure in present-day engines.

CHINOOK.

The construction of a public highway (the first ever proposed) leading from Guayaquil (Ecuador) into the interior of the country is projected. Commercial experts regard this enterprise as an opening in the future for the sale of motor cycles in this country.

INDUCTION PIPE DESIGN

The Influence of Induction Pipe Design on Ease of Starting and Petrol Consumption.

PRACTICALLY all details of engine design have recently been subject to a thorough threshing out in these pages, and great diversity of opinion on most details has been disclosed. There is, however, one point which is quite an important one in the design of any engine that, so far as I am aware, has not received the consideration it deserves, and this point is the design of the induction pipe.

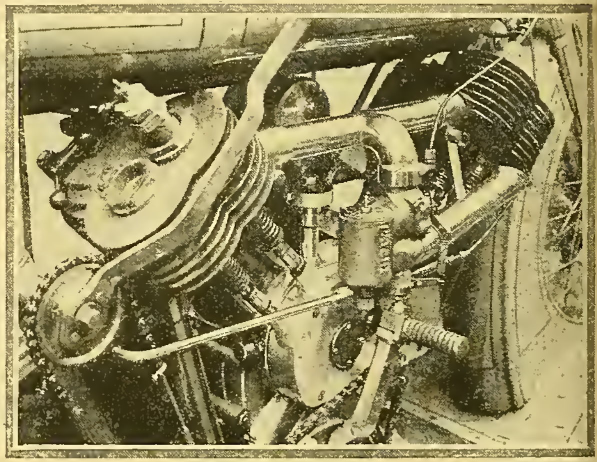
In the case of the single-cylinder machine this pipe is so short that there is no scope left for diversity of design, and, except that one machine may have a pipe slightly longer than another, it may be taken as read that all single-cylinder induction pipes are of one type, and that the design is settled.

The Latent Heat of Evaporation.

In the case of the twin this is, however, an entirely different proposition, and when one considers the important influence that the design of an induction pipe has on the running of an engine, it is surprising that more attention has not been paid to this important matter. The induction pipe determines primarily by its length, but also to some extent by its shape, ease of starting, and the petrol consumption of the machine. Evaporating petrol has a temperature lower than that of the atmosphere when this evaporation takes place, even though at the time the atmosphere may be somewhere round about zero; consequently, when an engine is given the first few revolutions for starting, the evaporation of the petrol at the jet actually cools the carburetter to a lower temperature than that at which it was previously, and if the engine does not start at once this cooling effect very soon takes place along the whole length of the induction pipe. Once the operation has been started it is cumulative in its effect, so that if the engine, for some other reason, happens to be stubborn in starting, the induction pipe is reduced to such a low temperature that any petrol vapour entering it from the carburetter is soon reduced to a state of liquid again, and probably never reaches the engine in the form of gas. If, of course, the engine starts at the first revolution, this cooling effect on the induction pipe has not time to get to work to militate against easy starting, but all the same it has its effect on the running, as will be seen shortly.

Long Induction Pipes.

An obvious question now presents itself. If a long induction pipe is likely to discourage easy starting, how is it that flat twins start so easily, as this type of engine nearly always possesses a long induction pipe? The answer is not so difficult as would at first sight appear, as other circumstances come into operation mainly because high speed is rapidly generated as a result of the outside flywheel, and the first explosion takes place before much condensation has had time to make its presence felt. In the case of V twins, however, this does not apply, and if, for some reason such as faulty ignition or a slight air leak, a V twin does not start very easily, the difficulty in starting in cold weathe will be very much increased in proportion to the lengt of the induction pipe. In warm weather the sam theory applies, naturally, but as the induction pip may have a temperature very much above that of th condensation of petrol, it takes some time before th whole of this heat is taken out of the induction pip by the condensation caused, and unless there is something radically wrong with the engine it should hav started long before serious condensation sets in. Th first explosion in any engine is a step towards th lessening of the condensation in the induction pipe because by heat conductivity the induction pipe i warmed, and this goes on with a continual increase o temperature in the induction pipe until this ha reached its maximum temperature, which, at the engine, will be practically that of the cylinder, but at the carburetter will be something very much lower. Now if the induction pipe is long and the reduction in temperature at the carburetter is serious, it is possible that the temperature may not be maintained sufficiently high to ensure complete evaporation at the high speed at which vaporisation must take place in a normally running motor cycle engine.



The P. and M. 90° twin engine and induction pipe details. According to the ideas of the writer of the accompanying article, the abolition of the elbow would be an improvement, even though it involved the abolition of the hot air pipe.

Wrapping the Induction Pipe.

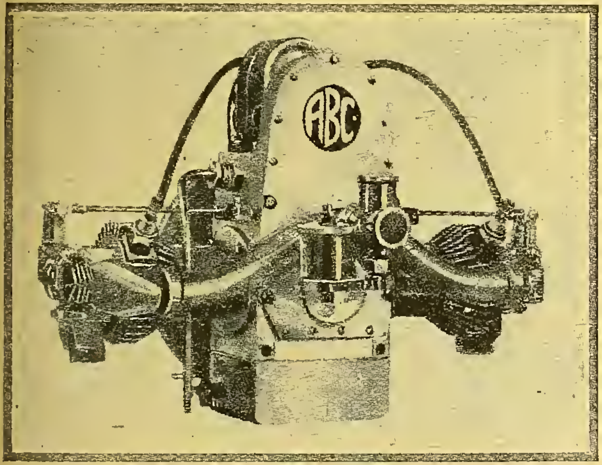
Now, as I have already said, the temperature of evaporation of liquid petrol is always lower than that of the surrounding atmosphere, it will be clear that wrapping a long induction pipe with insulating tape in order to keep it warm rests on fallacious reasoning, for an induction pipe exposed throughout its length to the presence of the air is subject to a warm influence on the outside, which in some measure tends to counteract the cooling influence on the inside. If

nduction Pipe Design.—

he induction pipe is wrapped with some non-conductng material such as insulating tape, the warming nfluence of the air is taken away and the pipe is subected solely to the cooling influence of the evaporatng liquid inside.

If the pipe happens to be made of good heat-conducting materials such as copper or aluminium, which, unfortunately, are used only rarely, this reasoning needs some qualification, for the heat of the cylinder will be conducted along the pipe and will tend to keep the pipe at a higher temperature than that of the atmosphere and consequently to assist vaporisation materially. The value of this reasoning depends, however, on the length of the pipe. If the pipe is a good heat conductor it will certainly get warm near the carburetter sooner than if it were made of a less heat-conducting material. On the other hand, if it is of good heat-conducting material it will also dissipate the heat very rapidly; consequently under these circumstances—*i.e.*, with a copper or an aluminium pipe—wrapping with some non-heat-conducting material should be good practice. It would be possible, however, to have a pipe of such a length—and it is also possible that such pipes are to be found in some present-day engines—that by the time the heat from the cylinders had reached the carburetter along the induction pipe, it would all be taken up by the evaporating petrol, so that the induction pipe at its point of junction with the carburetter might be actually below atmospheric temperature.

Thus a carburetter should be placed as close as possible to the cylinders, or, where a really close position is impossible on account of some point of design as in the case of a flat twin, the induction pipe should be brought to the carburetter by a path as close to the cylinder as possible. Some effort in this direction has been made in the A.B.C. T.T. motor cycle engine, which, of course, is famous for its general high efficiency.



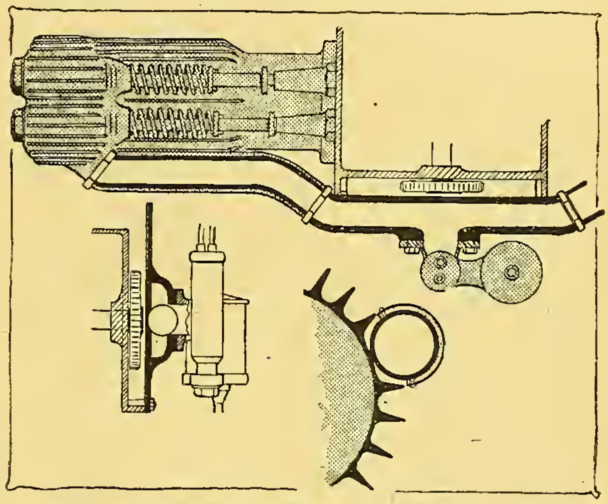
The 1914 T.T. pattern A.B.C. engine. The induction pipe is shorter than in some overhead valve flat twins.

A Suggested Ideal.

The ideal induction pipe design for a flat twin engine, in my opinion, would be a copper pipe from the inlet valve to the carburetter, with one side in contact with the cylinder and the other side, *i.e.*, the side open to the atmosphere, coated with some material or metal of poor heat-conducting properties, such, for instance, as a layer of asbestos, covered with tin for the sake of presenting a neat appearance. This pipe would be very soon heated by the cylinder when the engine was running, and the loss of this heat would be a difficult matter, on account of the asbestos and tin jacket. Starting, of course, would not be facilitated, but economy in petrol consumption would be much increased because there would be no chance of condensation, owing to the too low temperature of the pipe near the carburetter.

Post-war Fuels and the Induction Pipe.

The whole question of induction pipe design is, of course, closely connected with the question of post-war fuels. Most motorists are now reconciled to the fact that after the war, although fuel may be available, it will be very different stuff from that to which they have been accustomed. This point is one that has already received full recognition in America, and the up-to-date and go-ahead American designer is already working on devices for combating this evil when it arrives, and many of his efforts have been directed along the lines of improved induction pipe design.



Plan view of suggested induction pipe design for a flat twin engine. The pipe, which is made of aluminium, is covered on the side exposed to the air with a non-heat-conducting material, while where possible it is kept in actual contact with the cylinder, one of the flanges of which is removed to allow of this being done, as shown in the lower right-hand sketch. The left inset shows how the carburetter is kept as close as possible to the cylinder by the casting of this portion of the induction pipe in one piece with the timing gear cover.

This means, of course, the provision of artificial means of heating the induction pipe. Perhaps the most promising yet put forward is the enclosing of the inlet pipe inside the exhaust pipe, but up to the present this has only been done with four-cylinder engines, and it is doubtful whether it could be done with a motor cycle twin engine. The Henderson, for instance, has the induction and exhaust manifolds cast in one; the carburetter is close to the exhaust manifold, so is directly heated; while the induction pipe, being entirely enclosed by the hot exhaust gases, is always at such a temperature that condensation of petrol vapour would be quite impossible. RAMA.

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

CYCLE CARS.

Sir,—May I ask you to take pity on all those individuals who are interested in the simple cycle car? Now that your late contemporary, *The Light Car*, is no more, the whole movement is neglected. Let us have something concerning the simple three and four-wheeler as early as you like.

H. E. MOSS.

THE MOTOR CYCLE TRADE AND THE I.A.E.

Sir,—It was with interest I read in *The Motor Cycle* for May 2nd the article about the I.A.E. I am hoping to see more about the suggestion of including motor cycle engineers as members of the Institution. In peace times I was engaged in the motor cycle business and was an enthusiastic motor cyclist in my spare time. I should like to know what qualifications are necessary to become a member and the way membership is obtained

ARTIFICER, R.N.

TOO TECHNICAL?

Sir,—Little by little "Ixion" reveals himself. We know now that he cannot live in a glass house: we have only to compare "Occasional Comments" for the past year with those of five or six years ago—I know them no further back, alas!—to see this. No longer are we exhorted to drive our speedometers off the magneto sprocket, no longer are we thrilled by his "annual toss," but we are fed on "per b.h.p. hour" and other similar paragraphs. Yet he asks if *The Motor Cycle* is getting too technical! See to thine own house, David!

But, sir, seriously, would it not be possible to have Reminiscences—*à la* "Veteran," a little more often, or to start once more your "Looking Back" page? I enjoy every word of your technical articles, but still I sometimes feel that an article on the good old days would relieve their severity, and I fancy that I am not alone in this.

J. M. PHILPOTT.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—I feel sure there are many, like myself, who thank you for giving prominence to the case of the motor cyclists in the Royal Air Force being classed non-technical. As a motor cyclist myself, and my son a motor cyclist in the R.A.F. in France, I am greatly interested in this matter. Unless this classification is altered I feel sure it will discourage and create discontent amongst this section of the R.A.F. My son, although a motor cyclist, is an expert motorist, and has driven every kind of motor vehicle that is now used in the R.A.F., and there must be many more equally skilled now serving as motor cyclists.

The least the responsible officials can do is to give these men the same rank as the M.T. drivers, or give them the privilege to transfer to the M.T. I hope in the interests of all concerned the authorities will see that these men receive, as you say in your able article, the recognition which is clearly their just due.

A. G. COPELAND

Sir,—The trouble in the R.A.F. is identical with that which prevails in all the departments of the Army where motor cycles are being used. There is no man at the head of affairs that has any practical knowledge of motor cycles. Car men we have in plenty, but practical motor cyclists are conspicuous by their absence.

The regulation which forbids flying cadets riding motor cycles must have been agreed upon by a body of men who have no knowledge of motor cycling. The quickness of decision necessary to success in flying can only be cultivated by either flying practice or motor cycling. Every motor cyclist of experience knows this. Constant flying practice is impossible for cadets, and indeed the enormous expense of such training flights is manifest.

Splendid training for hand, eye, and brain is obtained by motor cycling at an infinite saving of labour, petrol, and time. And yet such motor cycling is forbidden. Why are the R.E. D.R. depots failing to train effective despatch riders? When, oh when, will the powers that be learn that motor cycles (be they employed for motor machine gun work, despatch riding, or any of the hundred departments where their utility has forced their adoption) must be regulated and controlled by highly placed officers who have a practical knowledge of the somewhat complicated machines with which their units are concerned? Wireless telegraphy, gunnery, engineering, all would be hampered and sterilised if placed under the control of men who have no knowledge of these subjects.

We know we are a foolish people who trust to muddle through, but such muddling is criminal. I myself have seen motor bicycles being passed out of the factory for service at the Front by a car man who had never ridden one in his life.

I have written on this subject before without avail, but trust that to-day another letter may do good.

CHARLES S. PATTERSON, M.B., M.R.C.S.
(Late Judge Auto Cycle Union.)

PAVÉ ROADS, BUTT-ENDERS, AND "CRITICISM"!

Sir,—"Tampion," in your issue of May 2nd, says that he would be pleased to see our own road authorities laying down *pavé* roads at home. They have done this fairly thoroughly in South Lancashire and the West Riding, and I can assure "Tampion," after 70,000 miles chiefly on these roads, that they are a perfect nightmare. I could map out a route for a six days' trial in the district lying roughly between Manchester and Leeds which would be an absolute test to destruction, especially of sidecars. If I could choose my roads I would never look at another stretch of *pavé* as long as I live.

With regard to his query about butt-ended tubes, the following may help him. Clean both butt and cup thoroughly with petrol. Smear both *thickly* with cycle solution (not motor cycle, it is too sticky), and then push the butt firmly into the cup. Leave it for about twelve hours—more or less according to the time of year and the general conditions of temperature, etc., and then press down the edges. This makes an absolutely strong endless tube, but if he wants a butt-ender, I am afraid he will not find one that will stand up to hard work. The only one I ever found at all satisfactory was a heavy John Bull, but even that would give out after a ridiculously small mileage—usually miles away from anywhere. If I ever have to buy a butt-ender at a small garage where there is nothing else in stock I always treat it in the above manner at the first opportunity.

May I also endorse "J.G.'s" letter in the same issue. The criticism he mentions has led a large number of my friends to discontinue the paper in question and at the same time to send an annual subscription to *The Motor Cycle*. It seemed to us so petty, so mean, and so unworthy, that the paper became impossible. We noticed, with satisfaction, that you treated it with the contempt it deserved, and I am sure many of your readers will join us in congratulating you, sir, on your silence under what was at times considerable provocation.

PADRE

THE CASE FOR THE LONG STROKE.

Sir,—We read with interest Dr. Lindsay's article in *The Motor Cycle* of March 28th, and would like to point out that, while the speed of 50 m.p.h., which has been attained by a 198 c.c. Levis, is probably a record speed for any two-stroke engine of similar size, we ourselves have considerably exceeded this speed with our 2¾ h.p. 350 c.c. models, on which we attained a speed of 60 m.p.h. in the 1914 Junior T.T. BUTTERFIELDS, LTD.

REMOVING THE CONTACT BREAKER.

Sir,—I have always understood that the contact breaker of the magneto of a 2¾ h.p. Douglas could not be removed without first taking off the flywheel, and I believe the makers say so in their handbook of this machine. My present Douglas (1915) has a Thomson-Bennett magneto, and I succeeded a few days ago in removing the contact breaker without disturbing either the flywheel or any other part of the magneto.

I proceeded thus: I unscrewed the screw attaching the contact breaker to the armature, and drew it out until it touched the flywheel. I then prised out the contact breaker until it was clear of the armature, and tilted it, when, of course, the screw could be taken out without any difficulty. The contact breaker itself could then be removed quite easily.

The Bosch magneto is similar to the Thomson-Bennett, so that this method will probably apply to it also, but I have not seen the E.I.C. and the Dixie, so I cannot say whether it is applicable to them or not.

The above method is so obvious that I cannot help thinking that it must be well known to Douglas riders.

J. H. DEWAR.

MAGNETO DESIGN.

Sir,—I have read with much interest the article on "A New Two-stroke V Twin Engine" in your issue of April 25th, and I think the designer is to be congratulated on what you term the fertility of his brain. I should like to offer one or two criticisms on the proposed ignition system.

1. The inductor should move rapidly into or out of the lines of force in order to obtain a high e.m.f. (It is not the number of lines of force that counts, but the *rate* at which this number changes.) As the piston is just nearing the top of its stroke it is moving comparatively slowly; consequently, the rate of change of the number of lines of force, and therefore the e.m.f., is small.

2. The magnetic circuit is too long. The primary winding of the coil being short-circuited during a portion of its time has a demagnetising effect on the magnetic circuit, and the lines of force, instead of passing through the core of the coil, would tend to pass through the lower part of the cylinder unless the inlet port was made abnormally wide.

3. Great difficulty would be experienced in making the contact breaker work magnetically, since the maximum number of lines of force depends on the speed, and this is variable. It is true that the spark would be advanced automatically as the speed increased, but it is improbable that the "advance" would be just enough and no more.

Again, owing to the vibration of the engine, certainty of operation with a given number of lines of force is doubtful.

4. Presumably, this alternative system is only intended to apply to single-cylinder machines. WILBUR.

Sir,—The ignition device fitted to the twin two-stroke engine described in your issue of April 25th is both interesting and ingenious, but for several reasons I do not think it would be as efficient as the rotary type of magneto.

The chief drawback, in my opinion, is the very low speed at which the lines of force would be cut, as when the inductor passes through the magnetic path the piston speed would be practically at its minimum value. With the engine running at 1,000 r.p.m. the mean piston speed would be roughly 400ft. per minute; the speed, of course, would rise from zero to 650ft. per minute, and back to zero every half revolution. A magneto with a 1½in. diameter armature running at engine speed (1,000 r.p.m.) would have a peripheral speed of about 390ft. per minute, or, practically, the same speed as the mean velocity of the piston. The piston speed at the moment the lines of force are cut would be far below this figure. Therefore, not nearly such a good spark would be obtained as with a rotary magneto.

The heat of the cylinder would probably have a very deleterious effect on the permanent magnet incorporated with the design; demagnetisation would probably be frequently experienced; also, the reluctance of iron increases with the temperature.

The high temperature to which the windings would be subjected would be unhealthy, but this, possibly, could be overcome by careful design. The maximum safe temperature for cotton insulation is, I think, about 173° F.

Undue simplicity is probably not desirable. The designer of the first internal-combustion engine probably was highly pleased when he designed the automatic inlet valve, and congratulated himself on having rendered his engine much less complicated. So he did: but he rendered his engine far less efficient. ENGINEER.

Batley.

PETROL FOR MUNITION WORKERS.

Sir,—In reference to the letter of "D.R., R.E.," of the 25th April, I do not wish to dispute who has the more right to the use of petrol for joy riding—soldiers on leave or civilians. It is only natural for the soldier to have the first consideration, but why assert that should the munitioner feel tired he go on strike?

I am one of thousands working in the Midlands, who, since the commencement of hostilities, have continuously worked 11¾ hours daily, and there are also those whose health has been seriously affected through excessive overtime, and they have not been on strike.

I hope that Mr. Churchill's statement in the Commons that the work accomplished during the Easter holiday has more than compensated for the time lost through disputes for a whole year, has come to the notice of "D.R., R.E."

If in the near future there is a quantity of petrol to spare, by all means let the munitioner have two or three months' joy riding—if you prefer to call it by this name.

GEORGE BLICK.

GARAGE CHARGES.

Sir,—As in the good old days we were respectively private owner and garage proprietor, your article on garage charges (April 18th) has been read by us with somewhat mixed feelings.

In common with many others, we fully realise the desirability of cheap storage in and around large cities, but, at the same time, there are two sides to the question.

You regard the matter from the aspect of floor space only, whereas, so far as the garage proprietor is concerned, this is almost a minor consideration. Did the average owner merely wheel or drive his machine into its allotted position matters would be simple indeed; but he is by no means so modest in his demands.

Should his tyres require inflating or his generator need cleaning out and refilling he does not hesitate to requisition the services of the nearest garage hand, and minor details soon absorb an amount of *time* which is by no means covered by the sum charged for garage.

He will use the nearest bench and vice, and, in spite of notices to the contrary, walk into the workshop and use whatever hand tools he requires, the said tools being frequently left in the sidecar. He, in many cases, endeavours to execute his own repairs and overhauls, expecting to receive help and advice whenever he gets into difficulties, which he often does at an early stage of the process.

A suggestion of payment for such services rendered, even if couched in the softest language, pointing out that he pays for garage only and not for use of tools and men's time, is invariably met by black looks and indignant threats to transfer his custom elsewhere—often to the great relief of the garage owner.

Taking all things into consideration, it is far from strange that the average garage owner is loth to lay himself out to cater for the sidecar and motor cycle owner, as even if a charge of 2s. 6d. to 3s. per week is made he usually stands to lose over the transaction.

As we stated in the beginning of this letter we fully realise the need for garaging at a low cost, and these remarks are not made in any spirit of meanness or antagonism to the class of owner in question; but, in common fairness, it should be borne in mind that the much abused garage owner has to make his living out of the business, however keen he may be on giving satisfaction to his customers.

We are fully aware that there are many riders who are not as portrayed, and with whom it is a pleasure to deal.

B.E.F. TWO LOOTS, R.A.F.

CARBURETTER ADJUSTMENT.

Sir,—In your issue of April 11th you printed a letter from me on "Carburetter Adjustment." Lest this should have given anyone a bad impression of the carburetter, I should like to say that, having carefully cured all air leaks in the induction system and valve caps, etc., and raised the petrol level in the float-chamber, the machine runs splendidly on jets 000, 3, and 7, giving a tick over, fierce acceleration, and ample power on hills. I do not agree with "Binker" that this is a difficult carburetter to adjust, provided one's engine is in order; I had no trouble once I made the above adjustments.

GEORGE B. AITKENS.

Sir,—With reference to the Binks three-jet carburetter, I have carried out several tests with this instrument (which was lent to me) on my 2½ h.p. Excelsior-Villiers two-stroke, but, like several of your correspondents, could not get anything near the results claimed for it.

After several short journeys at different settings, I took the machine to my favorite test ground (a run on the level and a good hill at the end). I took my old Amac and the Binks carburetters to test them fairly side by side, with these results:

Amac—26 jet (compression tap in carburetter body to introduce extra air). Highest speed, 41 m.p.h.; slowest, at the top of the hill, 8½ m.p.h. Petrol consumption, 92 m.p.g.

Binks—00 jet, 2, 5. Highest speed, 42½ m.p.h.; slowest, 9 m.p.h. Petrol consumption, 67 m.p.g.

Binks—00 jet, 1, 2. Highest speed, 36 m.p.h.; slowest, 8 m.p.h. Petrol consumption, 97 m.p.g.

The Amac setting was the same as that used for 870 miles, at average of 98 m.p.g. The Binks settings are the best of seven. In all cases there was a choking period between the pilot and the main jets. The figures were very carefully taken. The only advantage I found was that the engine would two-stroke at lower speeds with the Binks than with the Amac.

I think other readers' experiences would be interesting. I have tested five different carburetters, but cannot get one to equal the Amac for good all-round results.

I am thinking of fitting a light sidecar to this machine, and should be glad to have readers' experiences with a similar combination. What top gear used (I have a two-speed countershaft gear box), size of jet, general running, and if satisfactory? I only wish to carry a light passenger.

King's Heath. EXCELSIOR.

LOW V. HIGH GEARS: A SOLUTION.

Sir,—The top gear of 3¼ to 1 mentioned by "Four Crazy" appears to be about right, taking into account that his engine is 1,000 c.c., and has a low compression, that he rides solo, and is not too much troubled by running costs, fuel consumption, or any other restriction.

Will "Ixion" please note that I cited him as an apostle of high road speeds, not of high gears? I agree that higher speed is desirable in the case he mentions, namely, "dull stretches of road traversed for the umpteenth time," and also in a few other cases.

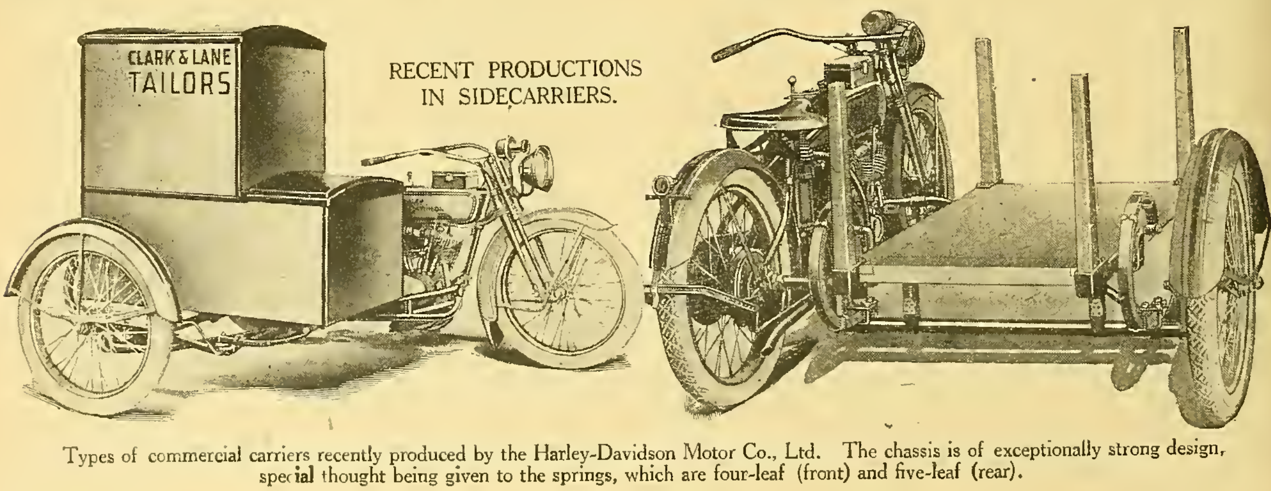
But I submit that ordinary riders are not *blasé*, that they are mostly owners of 3½ h.p. combinations or travel under conditions approximating thereto in power to weight ratio, and that my second-hand 'bus fully loaded could do 37 to 38 m.p.h. on the level (engine revs. 3,000) with a 6 to 1 gear, even when tuned for economy. The motor cycle has passed into a sphere of utility when it replaces railways on a holiday, and should be geared to suit. What is the sense of worrying along for three-fourths of the time to an accompaniment of alternate konks and deafening rattle divided by the petulant jerks of too frequent gear changing, and hoping for that open smooth stretch of road which, when found, is probably spoilt by a stiff head wind?

That part of my letter giving a solution acceptable to all seems to have been obscured by the title, "The makers could cater for both classes by providing a four-speed gear with direct drive on the two higher ratios." I recognise the conditions mentioned in your editorial, but I believe that (1) *most* riders like to climb reasonable inclines on a direct gear; (2) results of 20 m.p.h. average and 100 m.p.g. are good enough for most; (3) the "mean state" represented by one top gear ratio of about 5 to 1 gives satisfaction to few who would not be better pleased with two direct gears of about 4½ and 6 to 1.

"Ixion's" solution of a choice of sprockets is then not enough. I have five engine sprockets, but two cannot be in use at the same time. A four-speed gear with the third speed direct would suit us, but would not appeal to the fast rider. So I venture to propose two direct top gears which could be obtained by one method as follows: Dogs operated by the left foot to engage either of two chains running from the engine-shaft to a two-speed countershaft gear operated by the right foot, with multi-plate clutch inside the two large chain sprockets worked by Bowden cable to lever on the left handle-bar.

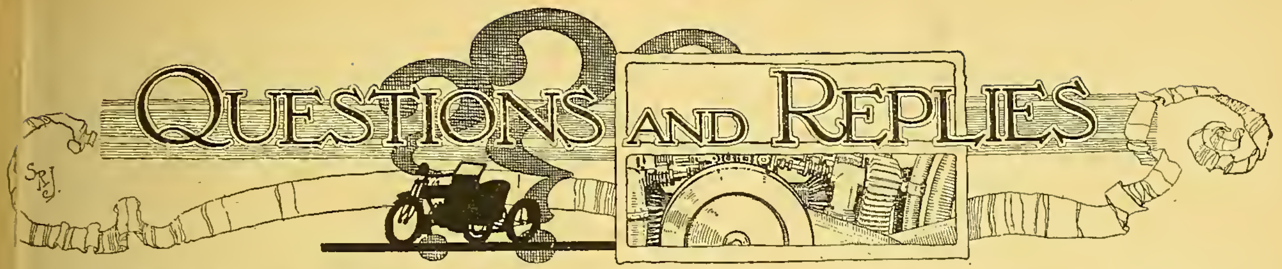
Having gone so far I may as well finish. Valve lifter on the right handle-bar; back and front brakes (belt rim pattern) applied by foot levers on right and left sides respectively with ratchets to hold them; rear chain on the right-hand side, and all chains totally enclosed and ⅝in. × ⅜in.; 80×120 (600 c.c.), two-stroke single, with outside flywheel between chains and crank case; Velocette lubrication; two side-by-side valves as in present four strokes, but inlet opening to be the same as exhaust; two exhaust pipes; the two valves to be worked simultaneously as exhaust valves by one cam on main shaft; magneto coupled directly to extension of the latter on the right-hand side; flat top piston; plug in centre of cylinder head; usual two-stroke inlet and transfer port arrangements; tank, two and a half gallons, for petrol only; very light sidecar body on aeroplane fuselage lines, without door; 710×85 mm. Palmer light car tyres; gear of 6 to 1, modified to suit slower revolution engine. W. R. DEUCHAR, SEC.-LT. R.E.

[*A number of interesting letters are unavoidably held over.* —ED.]



RECENT PRODUCTIONS IN SIDECARRIERS.

Types of commercial carriers recently produced by the Harley-Davidson Motor Co., Ltd. The chassis is of exceptionally strong design, special thought being given to the springs, which are four-leaf (front) and five-leaf (rear).



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects

Storing Inner Tubes.

? I shall be glad if you will please tell me which is the best way of taking care of spare inner tubes. I may explain that I have airy, dry, cool rooms, nd an airy cellar, which is dry, for cellar, but I am not sure if I should et the air have free access to the ubes or if I should shut them up in box with French chalk well dusted ver them.—Hansom Cab.

e best way is to store the tubes in a dark, cool place, or you may pack m in a box full of French chalk. It most desirable to keep them from ht and from a warm, dry atmosphere.

Armstrong Gears.

? I have two motor cycles with gears out of order, and should be glad of your opinion as to the cause of the trouble. (1.) Mark VI. gear. These gears were taken down by a local mechanic and I sent them away to experts, who returned them guaranteed in perfect condition. I cannot now get them fixed up. There is play in the hub case of approximately $\frac{1}{8}$in. to $\frac{3}{16}$in. The cones are turned up as far as they will go. Would an adjustment of the left cone before putting this gear in assist, or, if so, would balls of $\frac{3}{16}$in. instead of $\frac{5}{16}$in. in the right clutch ball race account for it? (2.) Mark III. These gears apparently worked all right until the push rod was taken out. The push rod, with strong spring, screws into the axle key. Now it will not move into the high gear forward lever position. Has the push rod been screwed up too far, or not far enough, or, in either case, would this affect it? Otherwise, what is the probable cause of the trouble? The gears have been well washed out with paraffin and well oiled. (3.) New Hudson belt rim. This is slightly bent and out of line. Can it be straightened up?—M.J.

1.) The trouble is apparently caused by ncorrect adjustment of the cones. The ight-hand cone should be slackened and he left-hand cone adjusted so that there s a minimum amount of play in the belt drum. The wheel is then adjusted by the right cone, and we think this would cure the trouble. In any case, it would be useless fitting other balls of different size in the gear. The correct size balls are: Belt rim side—Outside cone, $\frac{5}{16}$in.; round driver, $\frac{1}{4}$in.; inside of driver support, $\frac{3}{16}$in.; other side—One row, $\frac{5}{16}$in.; underneath clutch body, $\frac{3}{16}$in.; clutch fork, $\frac{1}{4}$in. (2.) Either the push rod is screwed in too far, the spring round the push rod is too long, or the spring in the case on the gear control rod is too weak. (3.) This might be straightened up by a good local repairer at your own risk.

Misfiring.

? I should be much obliged if you could suggest the reason for the following trouble: My mount is a 5-6 h.p. 1914 Clyno combination in first-class condition. The trouble is constant misfiring in the front cylinder—not due to ignition, or plugs, or air leaks. Spasmodic misfiring occurs when the engine is run slowly in neutral, but is not often noticed when travelling slowly on the road, and not at all in either case at higher speeds. There is a $\frac{1}{16}$in. gap between the tappet and inlet valve stem of the front cylinder, as the valve timing is a trifle early. The only reason I can think of is that the piston rings may be broken or stuck, and that the front cylinder is not exerting full suction on the inlet stroke. The compression in the front cylinder is considerably less than in the back, and I think this points to the above being the case. All the valves have been ground in recently, and I do not think there can be much at fault.—E.S.W.

In spite of your opinion to the contrary, we are inclined to think that the trouble is probably due to an air leak at the front cylinder induction pipe union. Also, one of the piston rings may be stuck or broken. A sixteenth of an inch gap between the tappet and inlet valve stem is far too much. The clearance should be about the thickness of the blue cover of *The Motor Cycle.* All valves should have practically the same clearance, and it is just possible that the extra clearance at one cylinder may partly account for your trouble.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD

Carburetter Flooding and Extraordinary Petrol Phenomenon.

? My machine is a 5 h.p. Indian, and I have been troubled for a considerable time by petrol flowing out of the air intake when the engine is running. The level is subnormal, and the inlet valves are in adjustment, and there is no leak at the float chamber needle valve. I should be greatly obliged if you would give an explanation of this curious leakage, as there is no sign of leakage when the engine is not running. By the way, I came across an amusing article the other day by "Road Rider," where he mentions lighting war time petrol with a detonator. As I wanted to imitate an H.E. shell exploding, for a stunt we were having, I put a fulminate detonator in a "petrol-tight" tobacco tin and filled it with petrol. I lit the time fuse and waited for a bang, a large sheet of flame, and a lot of black smoke. The detonator went off, blew the tin to pieces, but the petrol did not light!—R.F.A.

Either the valve requires grinding in or the level is still too high. The petrol should come to within $\frac{1}{16}$in. of the top of the jet. The level may be reduced by bending down the arms on which the float is suspended. If there is grit underneath the valve it need not be ground in, but should be merely tapped occasionally and sometimes turned round on its seating, when the grit will be displaced. The reason why the petrol did not explode may have been due to the fact that the mixture of air and vapour was not correct. It seems to be quite extraordinary that it did not light. This, again, may have been due to the fact that the mixture was incorrect, or the petrol may have been of very poor quality. Another possible explanation is that the fulminate of mercury explosion flame was not hot enough to light the petrol, and that the petrol was blown away before it had time to light

RECOMMENDED ROUTE.

Luton to Manchester.—P.K.

If you do not object to a few hills, we recommend *(a)*, but *(b)* is more level. *(a)* Luton, Dunstable, Woburn, Newport Pagnell, Northampton, Market Harborough, Leicester, Loughborough, Derby, Matlock, Bakewell, Buxton, Stockport, Manchester. *(b)* Luton, Dunstable, Fenny Stratford, Towcester, Daventry, Coventry, Lichfield, Rugeley, Stone, Newcastle-under-Lyme, Congleton, Alderley Edge, Cheadle, Manchester.

Office Removal.

Messrs. Hans Renold, Ltd., inform us that their London office is being moved to Bush Lane Chambers, Cannon Street, E.C.4, owing to the fact that the Air Board has taken over their former premises in Kingsway.

Opening of a New Depot.

We are informed by Messrs. S. Smith and Sons, Ltd., 179-185, Great Portland Street, London, W.1, that they have opened a depôt at 12, Jackson's Row, Deansgate, Manchester, news which will doubtless interest our northern readers. The premises will carry a large stock of Messrs. Smith's specialities, and will be a distributing centre for Lancashire and Yorkshire.

Industrial Reorganisation in the Tyre World.

Messrs. W. and A. Bates, Ltd., the manufacturers of John Bull tyres, etc., of St. Mary's Mills, Leicester, have taken a departure that should have considerable interest to all those concerned in post-war questions for industrial resettlement. Briefly, the scheme of Messrs. W. and A. Bates is one to effect the co-ordination of employees with the employers. The whole scheme has been worked out between the proprietors of the firm and representatives from the employees, and is now in operation, and is fully dealt with in an effectively got up booklet recently published by this tyre and belt-making firm.

There have, of course, been many suggestions made in various quarters that some such scheme as this is the key to the solution of all future labour difficulties, and there is no doubt that many firms are anticipating the official creation of some such system to meet the post-war situation.

We understand that Messrs. W. and A. Bates are quite willing to give information concerning the working of their scheme to anyone interested, with the idea that their experience may be of value to any later experimenters on the lines of the Whitley Report.

Catalogues Received.

Pedley Tyres and Belts. J. Pedley and Son, Ltd., Oxford Works, Great Charles Street, Birmingham. Export catalogue. This catalogue is got out for circulation amongst Messrs. Pedley's customers abroad, and is interesting as showing the enterprise of this firm in publishing weights and measurements for export in English figures and in the decimal system. For example, fifty heavy motor cycle covers and tubes in medium sizes can be packed into an export case of the following dimensions: 34×34×48in., occupying 32 cubic feet, the metric equivalents, which are given, being 864×865×1,220 mm., or .910 cubic metre.

Clincher London Premises Commandeered.

Once more the Government have found it necessary to "take possession" of an important block of business buildings and leave the ex-tenants to find a new home. It is but a week or two since the Air Board took over half of Kingsway, and to-day we learn that the North British Rubber Co.'s Great Portland Street premises have been chosen as a home for a further Government extension, and the present occupants have to find a new location at very short notice. The new address of the London tyre department will be 111-113, Great Titchfield Street, Oxford Street, W., while the export department, advertising and general manager's London office will be situated at 257-259, Oxford Street, close to Oxford Circus. Traders, exporters, etc., are requested to please note.

Enamelling Outfits.

Messrs. Jenson and Nicholson, L Stratford, London, E.15, have decidec supply complete enamelling outfits for owners and motor cyclists. These ou contain all the materials necessary renovate a car or motor cycle and sid completely.

New Hardening Process.

Those interested in the heat treatm of steels and in the use of what conventionally described as "new steel would do well to communicate w Messrs. Darwin and Milner, Ltd., Messrs. Sybry, Searls, and Co., Lt both of Sheffield, for particulars of th "Pyreks heat indicator compoun This is an invention of the originator Cobaltcrom steel, and is claimed to as simple and reliable in use as, a much cheaper to install than, any py meter installation.

The Wood-Milne Tyre Pump.

The Wood-Milne pump is a very use accessory for all owners of motor ca but, owing to its size and somewhat hi price, it is not largely used by mo cyclists. However, those motor owners who are using motor cycles order to economise in petrol will find t excellent foot pump to be still a ve useful garage accessory, fitted with adapter for motor cycle tyre valves. T pump, since it is worked by the foot, w originally designed to overcome t fatigue attendant on tyre inflation means of an ordinary hand tyre pum and the amount of labour saved pumping up a 650 × 65 tyre is perfect ridiculous in comparison with the ener which would have to be exerted to pun up the same tyre by means of an ordina motor cycle inflator. During the war t pump is being used to a large extent engineers' shops, for forced lubricati and testing, for inflating air beds hospitals, for testing radiators and tan after repair, and a host of other purpos for which Messrs. Wood-Milne Co., 2 Albion Street, Gaythorn, Mancheste have adapted it.

* * *

FOR OWNERS OF WATER-COOLED ENGINES.

ALTHOUGH the majority of motor cyclists are riders of air-cooled machines, there are, nevertheless, a goodly number of owners of the water-cooled type. To these anything that can possibly improve the efficiency of the engine circulating and cooling system should be a boon and a blessing. The average motor cycle water-cooling system really needs more attention and care than that of the normal car, as everything is made on a much smaller scale.

The smallness of the parts in the case of motor cycles makes the system far more liable to the main trouble that besets all water-cooling arrangements—the trouble of choked radiators as a result of "furring." "Fur," or the rust-like deposit that forms inside any container in which impure water is frequently heated (*e.g.*, in a kettle, boiler, or cylinder jacket), has a dangerous capacity for choking up any passages through which water may have to flow, and if its formation is allowed to go on unchecked the whole circulation in such a system as that found on a motor cycle soon becomes inoperative, or at least highly inefficient.

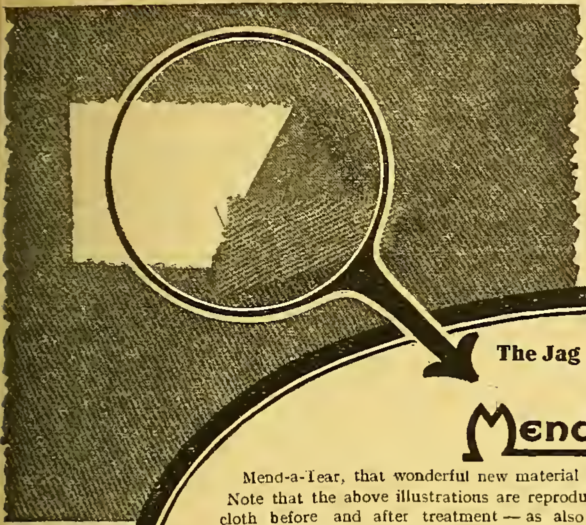
Experiments have been made to provide some preparation that will prevent the formation of this deposit and will remove it once it is formed, but, so far, as we are aware, the only effort that has met with unqualified success is that of Messrs. Boilerine, Ltd., of 885A to 897, Old Kent Road, S.E.15. The product of this firm is known as Boilerine tablets, which are sold in tins containing 200, 450, or 1,000 tablets.

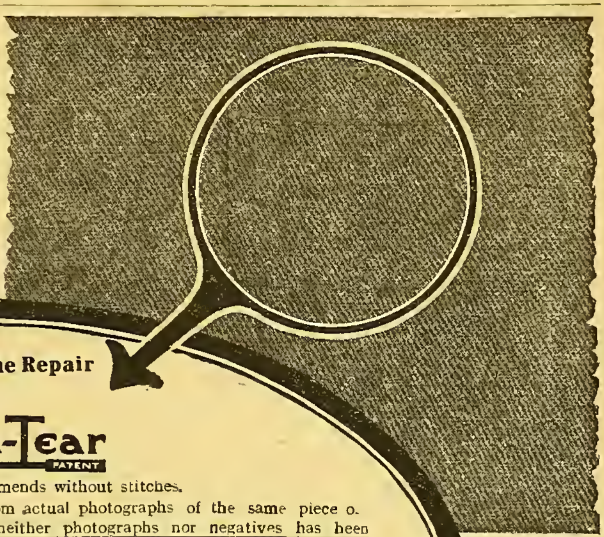
Clearing out "Fur."

While primarily intended to prevent furring up of radiators, the tablets are certainly efficacious in clearing out deposit already formed, as we have proved by our own experience. A radiator in our possession, much given to boiling when in use, has entirely given up this obje tionable trouble after three applications twenty tablets each to fresh water in th radiator. Incidentally, a slight leak ha also stopped, though there is nothing i the claims put forward for the preparatio that could lead one to expect this resul

To anyone troubled with radiator in efficiency, we have not the slightes hesitation in cordially recommendin Boilerine. The makers of the preparatio are also willing to test for hardness, with out charge, any water sent to them s that motorists may know just what "the are up against" as regards the coolin arrangements of their machines. Thi knowledge should be of the greatest us to all, as early recognition of the rea strength of one's enemy is half th battle won.

A very interesting booklet entitle "What Goes on in your Radiator," ma be had on application to Messrs. Boilerine Limited.





The Jag **The Repair**
and

Mend-a-Tear
PATENT

Mend-a-Tear, that wonderful new material which mends without stitches.
Note that the above illustrations are reproduced from actual photographs of the same piece of cloth before and after treatment — as also that neither photographs nor negatives has been touched by the artist.

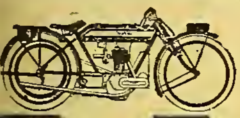
1292

And with this evidence before you, say if you would not like us to send you a free sample—
We will do so on receipt of PENNY STAMPED and ADDRESSED ENVELOPE
MEND-A-TEAR sells at

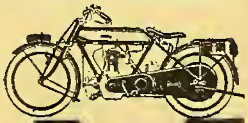
1/- PER CARTON,

but before you buy let us convince you.

LEICESTER RUBBER CO., LIMITED,
Makers of the World-Renowned John Bull Motor Cycle Tyre,
10, Granby Mills, Leicester



The NORTON was the FIRST of the efficient type of motor cycle engine, even as the Big Four was the first big single. Many of its successful features have been copied by competitors, some by permission, others acknowledged, and some have merely pirated, but we embody them all and know why.
The Ministry are taking the whole of our present output, but we have a waiting list.



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THE UNAPPROACHABLE THE UNAPPROACHABLE

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Write for the book of the Single.

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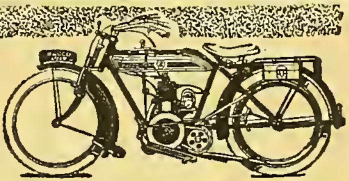

RIDER TROWARD & CO.

Our advertisement bill for the last three years has averaged something like a quarter of our total capital each year, and we have often been asked, "Does Advertising Pay?" Our answer is most emphatically "Yes, if it is gone about in the right fashion." Let us tell you why we advertise so freely, so that you may judge for yourself if results justify the expense. When we advertise, we have three leading rules always before us:

1. We first try to make our advertisement such as the reader will **see** it, and, having **seen** it, will not pass it by, but **will read it** to the end. An advertisement seen in passing, and not studied, is waste of time and energy.
2. We then state reasons **why** the reader should deal with us, rather than with any other firm—why we are, in our opinion, the best firm to deal with—and we seek to impress on the reader any special points in our favour which do not apply to other firms. This point is the second in importance.
3. We then tell the reader **what** we have to sell. An attractive advertisement telling you why you should purchase from us, and not stating what we have to sell, is again mere waste. And in stating what we have to sell, **we do not include goods** which we can only obtain to order, or which are **not ready** for immediate sale. Everything advertised by us is **ready for delivery.**

Now that we have told you why we advertise, and what we advertise, you will be interested enough to read all we have to say. As, however, we try to say the most possible in the smallest space, we ask you to write for fuller details of our terms of business, and as we cannot advertise our Stock of 200 Machines in the space at our disposal, we ask you to write for full list. The points of our dealings that we would impress upon you are as follow:

(*a*) We sell any machine by instalments—quarter down, balance to suit customer—provided that the machine remains in our possession till paid for. Thus a good mount can be obtained now, and paid for gradually, and be quite ready for use the moment the War ends. REMEMBER THAT EVERY MORNING YOU WAKE UP THE END OF THE WAR IS A DAY NEARER.

(*b*) We can now book orders for the best makes of Motor Cycles after the War, and, in the majority of cases, can promise early delivery. We only require a £5 deposit for any make of machine.

(*c*) We can accept War Stock to any quantity in payment. Thus you can at the same time help your country and help us.

(*d*) If you require any rare make of machine getting that is not in our lists, we can always obtain in a reasonable time.

(*e*) We can accept your old mount in part payment, either for another machine for immediate use, or as part payment for a new machine for delivery after the War. In the latter case you obtain full benefit of the present market prices, however long the War may last.

(*f*) If you purchase a Second-hand Machine from us, it is guaranteed. In addition to this, even if—though the machine is mechanically perfect—you do not like it, and wish you had bought something else, we will exchange, entirely free of charge, within three weeks of purchase.

(*g*) We will sell your old machine on commission, if you are not requiring another one now, and will make no charge if no sale results. On sales we charge 5% commission.

Now that we have told you **what** we can do for you, we give you a selection of **what** we can sell you. Your enquiry will have prompt and courteous attention, and we hope to hear from you.

SELECTION FROM STOCK:

1.	**ALLON,** 1916, 2-speed, 2-stroke	27 gns.
2.	**ALLON,** 1917, 2-speed, clutch, run 250 miles only	36 gns.
3.	**A.J.S.,** 1915, 2½ h.p., clutch, kick-starter, 2-speed	39 gns.
4.	**A.J.S.,** 1916 de Luxe Combination, spare wheel	89 gns.
5.	**AMERICAN EXCELSIOR,** 1917, 8 h.p., 3-speed, dynamo lighting Combination	85 gns.
6.	**ARIEL,** 1916, 3½ h.p., 3-sp. countershaft, clutch, kick-starter	49 gns.
7.	**BAT-J.A.P.,** 1914, 6 h.p., 3-sp., double-seater Sidecar	42 gns.
8.	**B.S.A.,** 1915, 4¼ h.p., 3-speed, chain-drive, solo	45 gns.
9.	**B.S.A.,** 1913, 3½ h.p., 2-speed, clutch	25 gns.
10.	**BRITISH EXCELSIOR,** 1916, 2-stroke, 2-speed, clutch	25 gns.
11.	**CALTHORPE-J.A.P.,** 1915, 2-speed, clutch	25 gns.
12.	**CALTHORPE,** 1915, 2-stroke, 2-speed	23 gns.
13.	**CAMPION-J.A.P.,** 1915, 4¼ h.p., 2-speed gear-box	37 gns.
14.	**DOUGLAS,** 1913, T.T., 2-speed	27 gns.
15.	**DOUGLAS,** 1914, 2¾ h.p., 2-speed, clutch, kick-starter	33 gns.
16.	**ENFIELD,** 1915, 3 h.p., 2-speed	32 gns.
17.	**ENFIELD** 1916 6 h.p. Combination	69 gns.
18.	**F.N.,** 1913, 5-6 h.p., 2-speed, clutch	29 gns.
19.	**HUMBER,** 1918, 6 h.p., 3-speed, flat twin Combination	89 gns.
20.	**HARLEY-DAVIDSON,** 1915, 7-9 h.p., 3-speed, double-seater Sidecar	65 gns.
21.	**HOBART,** 1915, 2¾ h.p., 3-speed, lady's model	29 gns.
22.	**INDIAN,** 1916, 5 h.p., 3-speed, disc wheels, T.T.	48 gns.
23.	**INDIAN,** 1915, 7-9 h.p., T.T., clutch	37 gns.
24.	**INDIAN,** 1915, 7-9 h.p., T.T., clutch, disc wheels	37 gns.
25.	**INDIAN,** 1914, 7-9 h.p., 2-speed Combination	45 gns.
26.	**INDIAN,** 1914, 7-9 h.p., 2-speed, clutch, spring frame	36 gns.
27.	**INDIAN,** 1914. 7-9 h.p., T.T., clutch	29 gns.
28.	**IVY-PRECISION,** 1914, 4¼ h.p., 3-speed, clutch, coach Sidecar	37 gns.
29.	**JAMES,** 1916, 2-speed, 2-stroke	26 gns.
30.	**JAMES,** 1914, 4¼ h.p., 3-speed	34 gns.
31.	**KERRY-ABINGDON,** 1914, T.T., 4 h.p.	22 gns.
32.	**LEA-FRANCIS,** 1915, 3½ h.p. twin J.A.P., countershaft	46 gns.
33.	**LEVIS,** 1916 Popular	22 gns.
34.	**LINCOLN-ELK,** 1913, 3½ h.p., variable gear	18 gns.
35.	**MOTOSACOCHE,** 1916, 3½ h.p. twin, Enfield gears, as new	44 gns.
36.	**MOTOSACOCHE,** 1914, 3½ h.p. twin, Enfield gears	31 gns.
37.	**MATCHLESS,** 1913, 6 h.p., 2-speed, coach Sidecar	35 gns.
38.	**MATCHLESS,** 1915, 8 h.p., 3-speed, Matchless Sidecar	59 gns.
39.	**MORGAN,** 1915, 10 h.p., Grand Prix J.A.P.	89 gns.
40.	**MORGAN,** 1914, 8-10 h.p. J.A.P., sporting, red finish	76 gns.
41.	**NEW HUDSON,** 1914, Big Six, 3-speed, coach Sidecar	47 gns.
42.	**NEW HUDSON,** 1915, 3½ h.p., 3-speed, coach Sidecar	39 gns.
43.	**NEW HUDSON,** 1916, 2-speed, 2-stroke	25 gns.
44.	**N.S.U.,** 1913, 3 h.p., 2-speed, twin	19 gns.
45.	**NEW IMPERIAL,** 1914, 2-speed J.A.P.	21 gns.
46.	**NEW IMPERIAL,** 1915, 2-speed J.A.P.	23 gns.
47.	**N.U.T.-J.A.P.,** 1915, 3½ h.p. twin, 3-speed, disc wheels	48 gns.
48.	**NORTON,** 1918, new military model, 3-speed	79 gns.
49.	**O.K.-J.A.P.,** 1916, 2-speed, clutch	26 gns.
50.	**O.K.-PRECISION,** 1914, 4 h.p., T.T.	19 gns.
51.	**P. & M.,** 1912, 3½ h.p., 2-speed, renovated	22 gns.
52.	**PRECISION,** 1913, 3½ h.p., 2-speed	22 gns.
53.	**PREMIER,** 1915, 2½ h.p., clutch	23 gns.
54.	**PREMIER,** 1913, 3½ h.p., 2-speed clutch	24 gns.
55.	**PREMIER,** 1913, 3½ h.p., 3-speed, Sidecar	31 gns.
56.	**PREMIER,** 1914, 3½ h.p., 2-speed, countershaft	29 gns.
57.	**PREMIER,** 1914, 3½ h.p., 3-speed Combination	36 gns.
58.	**PREMIER,** 1915, 3½ h.p., 3-speed Combination	45 gns.
59.	**PREMIER,** 1916, 3½ h.p., 3-speed Combination, Service finish	49 gns.
60.	**QUADRANT,** 1913, 4½ h.p., 2-speed, clutch	29 gns.
61.	**RUDGE MULTI,** I.O.M., 1917, T.T., 3½ h.p., clutch, as new	58 gns.
62.	**RUDGE MULTI,** I.O.M., 1916, T.T., 3½ h.p., clutch, perfect	58 gns.
63.	**RUDGE MULTI,** 1914, 3½ h.p., renovated	36 gns.
64.	**RUDGE MULTI,** 1914, 3½ h.p. Combination	38 gns.
65.	**RUDGE,** 1913, T.T., 3½ h.p.	25 gns.
66.	**ROVER,** 1913, 3½ h.p., clutch	23 gns.
67.	**ROYAL RUBY,** 1915, 2-stroke, renovated	22 gns.
68.	**SCOTT,** 1913, 3¾ h.p., coach Sidecar	36 gns.
69.	**SINGER,** 1913, 3½ h.p., clutch	23 gns.
70.	**SINGER,** 1914, 2½ h.p., clutch, T.T.	22 gns.
71.	**SHEFFIELD MINOR,** 1916, 2-stroke, as new	21 gns.
72.	**SUN-VILLIERS,** 1916, 2-stroke, single-speed	18 gns.
73.	**SUN-VILLIERS,** 1916, 2-stroke, 2-speed	24 gns.
74.	**SWIFT** Cycle Car, 1915, 8-10 h.p., 2-seater	119 gns.
75.	**TRUMBULL,** 1915, 12 h.p., Car, 3-speed	79 gns.
76.	**T.D.C.,** 1915, 2-stroke, 2-speed	22 gns.
77.	**T.D.C.,** 1917, 2-stroke, as new	19 gns.
78.	**TRIUMPH,** 1913, T.T., 3-speed	29 gns.
79.	**TRIUMPH,** 1913, 3½ h.p., T.T., single-speed	22 gns.
80.	**WILLIAMSON,** 1915, 10 h.p., water-cooled Combination	65 gns.
81.	**CLYNO,** 1915, 6 h.p., 3-speed, spare wheel, coach Sidecar	59 gns.
82.	**VELOCE,** 1916, 2-speed, 2-stroke	28 gns.
83.	**WOOLER,** 1915, 2-speed, 2-stroke, spring frame	24 gns.
84.	**ZENITH-GRADUA,** 1916, 4-5 h.p. twin, T.T., as new	52 gns.
85.	**ZENITH-GRADUA,** 1915, 8 h.p., coach Sidecar, hood, screen, as new	65 gns.
86.	**ZENITH-GRADUA,** 1914, 6 h.p., clutch, kick-starter, coach Sidecar	46 gns.
87.	**ZENITH-GRADUA,** 1914, 4 h.p., renovated	35 gns.

Any machine sent on "The Motor Cycle" deposit system.

RIDER TROWARD & Co.

31 & 40b, High Street, HAMPSTEAD, N.W.3.

'Phone: Office, 5392; Works: 4904, Hampstead. Open till 7 p.m. and Sundays. One minute Hampstead Tube.

MISCELLANEOUS ADVERTISEMENTS.

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advertisements in this section should be c panied with remittance, and be addressed offices of "The Motor Cycle," Hertford , Coventry. To ensure insertion letters d be posted in time to reach the offices of T Motor Cycle," Coventry, or London (20, r St., E.C.4), by the first post on Friday ing previous to the day of issue.

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e proprietors are not responsible for clerical inters' errors, although every care is taken oid mistakes.

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the convenience of advertisers, letters may be ssed to numbers at "The Motor Cycle" Office. this is desired, the sum of 6d. to defray the cost of ration and to cover postage on replies must be added advertisement charge. Only the number will appear advertisement. All replies should be addressed 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

sons who hesitate to send money to unknown persons deal in perfect safety by availing themselves of our sit System. If the money be deposited with "The r Cycle," both parties are advised of this receipt.

e time allowed for a decision after receipt of the is three days, and if a sale is effected we remit the nt to the seller, but if not we return the amount e depositor, and each party to the transaction pays ge one way. For all transactions exceeding £10 in , a deposit fee of 2s. 6d. is charged; when under the fee is 1s. All deposit matters are dealt with at ntry, and cheques and money orders should be made ble to Iliffe & Sons Limited.

e letter "D" at the end of an advertisement is an ation that the advertiser is willing to avail himself of Deposit System. Other advertisers may be equally ous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no ver to their enquiries are requested to regard the ce as an indication that the goods advertised have dy been disposed of. Advertisers often receive so y enquiries that it is quite impossible to reply to each by post.

MOTOR CYCLES FOR SALE.

A.B.C.

B.C., 1914, not ridden year, P.V. spring frame, Jardine gear box, sporty turnout; £50.—Edwards, 103, earn Rd., Catford, S.E.6. [5095

A.J.S.

J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres; £92.—Exeter Motor Cycle Co., , Bath Rd., Exeter. [3520

MEDIATE Delivery from stock of the Military Model A.J.S.—Elce and Co., 15-16, Bishopsgate Camomile St., E.C.3. [0551

16 4h.p. A.J.S., No. 8,070, complete with 2 lamp sets, mechanical horn, Cowey speedometer, pump, of tools, approximate mileage 3,000, in perfect con n; £75.—Robinson's Garage, Green St., Cambridge. [5156

J.S., 2¾h.p., 2-speed, lamp, horn, £35; 1914 2¾h.p., 3-speed, Lucas lamp, mechanical horn, spare tank, /10; new Military Model also supplied; E.P. or ex ge.—Service Co., 292, High Holborn, London. [X4301

J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; /6; no permits required.—P. J. Evans, sole agent Birmingham and district, 87-91, John Bright St., ningham. [4945

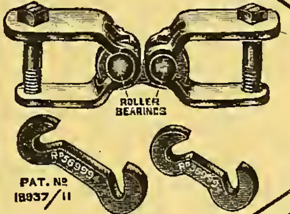
J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [4987

As you'd never question the three sides of a triangle so, when once you know the

FORWARD FASTENERS

you'll never doubt the triple merits of their Service-Strength, Long Wear, and General Efficiency. Try them and see.

Forward Motor Co.,
Forward Works,
Summer Row,
B'ham



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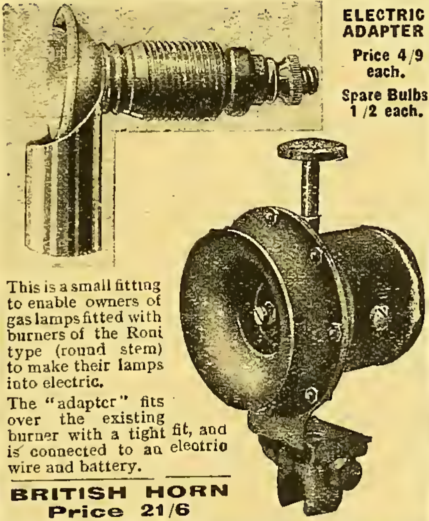

ELECTRIC ADAPTER

Price 4/9 each.

Spare Bulbs 1/2 each.

This is a small fitting to enable owners of gas lamps fitted with burners of the Roni type (round stem) to make their lamps into electric.

The "adapter" fits over the existing burner with a tight fit, and is connected to an electric wire and battery.

BRITISH HORN
Price 21/6

F.R.S. LAMPS, "BEAM" Works, Pershore Street, BIRMINGHAM.

ROSCO CYLINDER BLACK.

PRESERVES YOUR CYLINDERS.

Tins, 6d.	Withstands Heat.	Post Free, 8½d.
Tins, 1/-		Post Free, 1/3½.

Sole Manufacturers:

OWEN BROS., HULL, Eng.

IMPORTANT NOTICE.

Owing to the Whitsun Holidays, the issue of "The Motor Cycle" for May 23rd, must be closed for press earlier than usual. All copy and instructions for Miscellaneous Advertisements in that issue must, therefore, be in our hands not later than first post on Thursday, May 16th.

DEFENCE OF THE REALM ACT

Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the production of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. 1915½ 6h.p. De Luxe Combination, special engine, detachable wheels, spare wheel with voiturette tyre and waterproof cover, special wind screen, apron, Lucas horn, head, side, and tail lamps, speedometer, watch, trunk, straps, waterproof covers, several spares, fast machine, sparingly used, perfect condition; £87/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5136

Alldays.

ALLDAYS Matchless, 3½h.p., 3-speed, trader's combination, just overhauled, like new; sacrifice £42, or nearest offer.—125, Soho Rd., Handsworth, Birmingham. [X4270

ALLON, 2¾h.p., single, £38, new; 2-speed, £45, new; 2-speed and hand clutch, £48, new; 2-speed, £28/10; E.P., or exchange.—Service Co., 292, High Holborn, London. [X4298

ALLON, 2¾h.p., brand new, 2-stroke, never been on the road, and guaranteed; reduced price £32.—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [4902

ALLON, late 1917, 2¾h.p., 2-speed, 2-stroke, clutch, h.b.c., lamps, horn, and all accessories, complete, new, done only 60 miles; £45, a bargain.—Apply, Box L6,139, c/o *The Motor Cycle.* [5159

ALLON, 2-speed, new last year, but only had three months' actual use, fully equipped, and nicely run in, a luxurious little mount, and indistinguishable from new; first with 30 gns. secures.—Bayliss, 239, Walsall Rd., Darlaston, S. Staffs. [5073

Ariel.

ARIEL 1914 5-6h.p. Twin, Senspray, 3-speed countershaft, C.B. sidecar, accumulator, electric lighting, tyres perfect; £52.—Williams, 2, Beaconsfield Rd., New Southgate. [5119

ARIEL, 1915, 3-speed, 3½h.p., countershaft gear, clutch, kick starter, decompressor, lamp, horn, speedometer, electric rear lamp, splendid running order, only done 5,000 miles, £47/10; also coachbuilt sidecar, £10; together or separately.—44, Burton Rd., Melton Mowbray. [5088

Bat.

8h.p. Bat-Jap, 1914, spring frame combination, with two sidecar bodies, and in good running order; must sell, no petrol; £35, lowest.—James Pollard, Wragby, Lincoln. [5079

6h.p. 1916 Bat, 2-speed countershaft model, round tank, fitted with all accessories, mechanically fit as new, powerful solo mount; £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5135

MOTOR CYCLES FOR SALE.

Bradbury.

BRADBURY, 1915, 4h.p., 3-speed, new sidecar; £35, offers; will separate.—Dunstan, Salcombe. [X4314

BRADBURY, 1914, 6h.p., 3-speed, and sidecar, £55; 1912-13 3½h.p., 3 speeds, with coach sidecar, £32/10; 1913 3½h.p., 3-speed model, £29/10.—Motor Exchange, Horton St., Halifax. [5098

BRADBURY, 4h.p., late 1912, T.T., Bosch waterproof, B. and B., good tyres, Lucas lamps, generator, horn, just overhauled, re-enamelled, excellent condition; sacrifice £19/10; appointment.—Holvoet, 141, Goldhurst Terrace, Hampstead. [5149

B.S.A.

B.S.A., I.O.M. model, 3-speed; £37/10; E.P. or exchange.—Service Co., 292, High Holborn, London. [X4300

B.S.A. Model K., 3-speed countershaft, little used, fully equipped; best offer.—Coffin, Holwell, Sherburne. [X4238

B.S.A., 1916, 4¼h.p., 3-speed, Model H. combination, speedometer, spare tyre, tubes, and tools; £60.—97, High Rd., Chiswick, London, W. [5063

1917½ B.S.A., fitted with Montgomery sidecar, mileage under 2,000, guaranteed perfect; £64; see Miscellaneous.—Billy Grindley, Prees, Salop. [X4215

B.S.A., very late 1917, 4¼h.p., chain-cum-belt, ridden twice, indistinguishable from new; £60.—Capt. Thornley, Garden Flat, 95, Fitzjohn Av., N.W.3. (D) [5057

B.S.A., late 1913, 2-speed, free engine, 3½h.p., Gloria sidecar, lamps, horn, etc., in good condition and running order; £40.—Woodman, Chemist, Burnham-on-Sea. [X4224

1917 B.S.A., 4¼h.p., Model K., 3-speed, clutch, Mills-Fulford sidecar, Lucas lamps, speedometer, Euk easy starter, new spare tube, tools, and spares, the whole outfit as new; £75.—29, Admiralty Rd., Rosyth, N.B. [X4269

B.S.A., 1917½, with Montgomery sidecar, fully equipped, numerous spares, 3 lamps, mechanical horn, brand new Dunlops all round, filled up and ready to ride away; first cheque for £64.—Billy Grindley, The Motor Cycle Specialist, Prees, Salop. [X4214

4¼h.p. 1916 B.S.A., 3-speed countershaft model, all-chain drive transmission, clutch, kick starter, condition almost as new, includes accessories; price £55; a new B.S.A. De Luxe sidecar is available, and can be fitted at once if required.—Wauchope's, 9, Shoe Lane, London. [5134

Calthorpe.

1916 Calthorpe, 2-stroke, lamps and horn; £30.—Parker and Son, St. Ives, Hunts. [5044

CALTHORPE-J.A.P., 1916, 2¾h.p., 2-speed, free engine; accept £26.—Box L6,138, c/o *The Motor Cycle.* [5161

LATE 1917 Calthorpe-Jap, 2¾h.p., 2-speed, used 200 miles only, as new; £28.—Grove, Llanthony Abbey, Gloucester. [X4233

NEW 2¾h.p. Calthorpes; delivery from stock; J.A.P. engines, 2-speed gear models, £39/18; single speed models, £32.—Wauchope's, 9, Shoe Lane, London. [5133

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [4947

1917 Calthorpe-Jap, 2¾h.p., Enfield 2-speed, lamps, tools, 3 bags, new April, scarcely ridden, unused since July, all brand new condition; cost £43; a beauty; will sell £36.—Smith, Ramsey Rd., Horfield, Bristol. [X4183

Chater-Lea.

CHATER-LEA Combination for sale, 8h.p., thorough good machine; cheap.—270, High Rd., Chiswick, W. [5069

Corah.

CORAH, 5-6h.p. J.A.P., combination, cane sidecar, 2 speeds, P. and M. gear, all chain, 2 new tyres, good condition; £32, offers.—Hinson, Bourne, Lincs. [X4244

Clyno.

CLYNO, 1916, 6h.p., spare wheel, Bosch mag., sidecar brake, screen, accessories, fast, little used; owner on active service.—Capt. Palmer, 47, Chestnut Av., Leeds. [5118

FIRST Reasonable Offer for Clyno combination, late 1912, 5-6h.p., 2-speed, clutch, kick starter, hood, screen, spare tube and tyre, in good going order; neglected, suit tradesman.—Andrews, 165, Lancaster Rd., Notting Hill. [5076

CLYNO 6h.p. Combination, 1914, detachable wheels, spare wheel and steel-studded cover, De Luxe coachbuilt sidecar, with hood and screen, includes all accessories; £65; very powerful and efficient machine.—Wauchope's, 9, Shoe Lane, London. [5144

Coventry Eagle.

COVENTRY Eagle, 2½h.p., 2-stroke Villiers engine, brand new, and guaranteed, but shop-soiled only; £32.—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair [4903

Diamond.

DIAMOND, 1913, countershaft 2-speed gear, chain drive; £25/10.—Motor Exchange, Horton St., Halifax. [5099

SPECIAL OFFER THIS WEEK.

6 h.p. **A.J.S.** and Sidecar with screen, new October, 1915, not ridden 2 years; in absolutely perfect condition in all respects. Price, including lamps and horn, only **70 gns.** Very great bargain.

Also the following in Stock:

1918 **NEW HUDSON** and Sidecar, 4 h.p.	£86 12 6
1918 **A.J.S.,** 6 h.p., and Sidecar	£113 6 0
NEW IMPERIAL, 2½ h.p.	39 Gns.
NEW IMPERIAL-J.A.P., kick-starter ..	46 Gns.
LEVIS POPULAR, 2-stroke	£32 0 0
1918 **LEVIS,** 2½ h.p., 2-speed	£47 10 0
1918 **LEVIS,** 2½ h.p., 2-stroke	35 Gns.
1918 **ROVER,** 5-6 h.p. J.A.P., and Sidecar	£124 8 0
1918 **ROVER,** 5-6 h.p., J.A.P.	£97 10 0
ROVER, T.T., Philipson	£67 10 0
ROVER, 3-speed clutch	£80 0 0
ROVER, T.T., Philipson, shop-soiled ..	45 Gns.
ROVER, 3-speed, clutch, kick-starter; only used 6 months	50 Gns.
B.S.A., 4¼ h.p., and new Mills-Fulford Sidecar	70 Gns.

JULIAN,

84, Broad Street, READING.

Biggest Light Car and Motor Cycle Dealer in the South.
'Phone: 1024. Closed Wednesdays 1 o'clock.

MAGNETO REPAIRS

and spare parts

We are well qualified to undertake the repair of Magnetos of all makes, and to supply spare parts, being, as we are, one of the most experienced firms manufacturing Magnetos

SIMMS MOTOR UNITS, LTD.,
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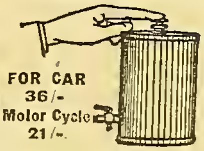
THE EUK EASY STARTER



ELIMINATES EVERY STARTING DIFFICULTY.

FOR CAR 36/-
Motor Cycle 21/-.

Fitted in 10 minutes. Operated by a touch. Acts instantly. Gives absolutely perfect easy starting. Never fails. Praised by over 33,000 satisfied users.

Write for details.

ALEXANDER & CO., Dept. B, 115, Lothian Road, EDINBURGH; 274, Gt. Western Road, GLASGOW.

Photography and FOCUS EVERY WEDNESDAY. TWOPENCE.

MOTOR CYCLES FOR SALE

Douglas.

2¾h.p. 1914 Douglas; £35; guaranteed.—Wau 9, Shoe Lane, London.

DOUGLAS, 2¾h.p., good order; cheap; no —270, High Rd., Chiswick.

DOUGLAS.—Prompt delivery to those on national importance.—Gibb, Gloucester.

1914 T.T. Douglas, 2-speed, Lucas lamps and very fast; lowest £28.—The Oak, Cann H Leytonstone.

DOUGLAS; prompt delivery to farmers, docto others doing work of National importance.—Yeovil. Tel.: 50.

DOUGLAS, 1914, 2-speed, speedometer, spare good condition; price £30.—Richardson, Marine Infirmary, Deal.

1915 4h.p. Douglas, 2-speed, lamps, horn, et fect order, and good as new; £46.—A Motor Co., Abergele, N.W.

DOUGLAS Motor Cycles.—We can supply by 1918 models on receipt of permit.—Eli the Douglas agent, 196, Cheltenham Rd., Bristol.

1913 Douglas, 2¾h.p. twin, 2-speed gear, foo usual accessories, splendid condition, ver £25.—R. Bamber and Co., Ltd., 33, Liverpool Rd. dale, Lancs. Tel.: 44.

DOUGLAS.—New 1918 models supplied to fa doctors, etc., against Ministry of Munitio mit. 1913 2-speed, £31/10; 1914, 2 speeds, £3 Motor Exchange, Horton St., Halifax.

DOUGLAS, 1913, T.T., 2¾h.p., 2 speeds, eng cently overhauled, cylinders reground, new fitted, new tyre and belt, guaranteed perfect; £25 exchange bicycle.—Stratton, Mount Pleasant, Re

DOUGLAS, 1914, 2¾h.p., 2-speed, just been oughly overhauled and re-enamelled, and lightweight Watsonian sidecar, lamps, tools, etc.; separate; £42.—F. Shurman, 77a, Exton St., W Rd., S.E.

DOUGLAS 1915 4h.p. Combination, 3 speed kick start, all accessories, bargain, £60; four 2¾h.p. models, all in excellent condition, from £ —Maudes' Motor Mart, 100, Gt. Portland St., L W.1. Tel.: 552 Mayfair.

1917 4h.p. Models A. and B. Douglas, 2¾h.p. W., also U. and V. 1916 specification, abs new; immediate delivery against Priority Perm doctors, farmers, war and munition workers.—Ho where to apply, full particulars, write Douglas Speci Robinson's Garage, Green St., Cambridge.

Enfield.

ENFIELD 1915 6h.p. 2-speed Coach Combin in fine order, £72/10; 1916, £82/10.— Exchange, Horton St., Halifax.

1913 2¾h.p. Twin Enfield, 2-speed, free engine starter, excellent condition; £25, or near —Young, Enderlie, Aldridge, Walsall.

6h.p. Enfield Combination, as new, little used, equipped; £60, or take cheaper machine and —436, Whitehorse Rd., Thornton Heath.

1916 Enfield Combination, all brand new Palmer Lucas lamps, speedometer, perfect cond £70.—Grove, Llanthony Abbey, Gloucester. [X

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto s G.T. Model, £57/10; delivery from stock.—E Motor Cycle Co., Ltd., Bath Rd., Exeter.

ROYAL Enfield Combination, 1916, 6h.p., b new, condition new, been very little used; bought car.—Clarke, Linden Grove, Middlesbroug [X

3h.p. 1915 Royal Enfield, 2-speed gear model, with accessories, mechanically fit, good tyres; £32/10; guaranteed.—Wauchope's, 9, Shoe London.

ENFIELD Late 1915 Combination, £75; motor only, £35; 1916 combination, splendid order gns.; E.P. or exchanges.—The Service Co., 292, Holborn, W.C.1. [X

6h.p. 1917 Enfield Combination, electric ligh speedometer, horn, spare tyre and tools, cond perfect.—Renshaw Engineering Co., 2, Altenburg dens, Battersea Rise.

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Excelsior.

EXCELSIOR, 1916, 7-9h.p., 3 speeds, all lamps horn, only done 750 miles, and guaranteed new; bargain, £50.—Maudes', 100, Gt. Portland London, W.1.

THE MOTOR CYCLE
ESTABLISHED IN 1903
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The Decimal System.

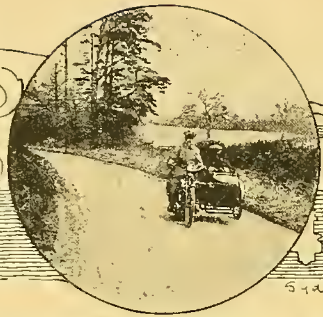
THE decimal or metric system, which means counting by tens, thus doing away with our absurd coinage, weights, and measures, may be possibly adopted in this country. It is a system not unknown to our readers, as, since the internal combustion engine originally came from our great and noble Ally France, it has always been customary to reckon the bores, strokes, and cubical capacities in the metric style. Only a few conservative motor cycle engineers have attempted to describe engine sizes in inches, and when they have done so they have conveyed so little meaning to our readers that in "Buyers' Guides" all dimensions have been given in mm. The statement that an engine has a bore of 90 mm. has a clear meaning to the average motor cyclist, far clearer, we venture to think, than its approximate equivalent in inches, for we are already accustomed to the use of the metric system in this connection.

Though the system came into force after the French Revolution, the famous British engineer James Watt laid down a plan seven years before which very clearly resembled the French scheme. We can all remember in the days of our youth how much time and how many tears were shed over learning our weights and measures and doing compound sums, and with what relief we were moved on from fractions and decimals. This is what the adoption of the metric system would mean—the scrapping of all tables, the abolition of compound sums, the general simplification of commercial and industrial arithmetic, and the bringing into practice of a practically universal system of reckoning which would improve the foreign trade which is to help us to recover from the effects of this terrible war.

So far we have dealt with the matter only in so far as engine measurements are concerned, but if the system is used in the making of our motor cycles it must also be used in paying for them. The metric system, therefore, would be introduced into coinage as well. What most experts who are working on the scheme seem to have forgotten is that it is most essential to retain the names of the old coins; even in France the five centimes piece is still called the *sou*. They agree to retain the sovereign and its tenth part the florin, but they call the shilling a half-florin, and the sixpence a quarter-florin, and in our humble opinion they go off the mark altogether when they get below this coin, as they divide the sovereign into 1,000 parts, each of which is called a mil—a name quite unknown. Would it not be better to copy Continental practice, let the shilling remain as it is and make ten pennies go to the shilling by raising the value of the penny? Then introduce a new small coin, the English cent, which would be the English *centime*, or, since it would be our smallest coin, the old name farthing could be retained. Of these ten would go to the penny, five to the halfpenny, and 100 to the shilling. If smaller coins were needed to subdivide the penny, which would be nickel, bronze cent and two-cent pieces could be used.

It is quite impossible in such a short article to do justice to the metric system, but we may conclude by saying that if adopted it would benefit the whole country by increasing our export business and by simplifying calculation in all trades and industries. There are objections against it, and pretty powerful objections too, but so there are against the most beneficial innovations. We have only to consider the daylight saving scheme, which was laughed to scorn before the war, but which has since been found to have been of inestimable service to the country, and we think we have but few readers who, when peace reigns on earth once more, will not be glad to enjoy those precious hours of daylight on their motor cycles during the long summer evenings.

Those who are interested in the metric system should apply for interesting literature on the subject to the Decimal Association, Finsbury Court, Finsbury Pavement, London, E.C.1.



An Infinitely Variable Change Speed.

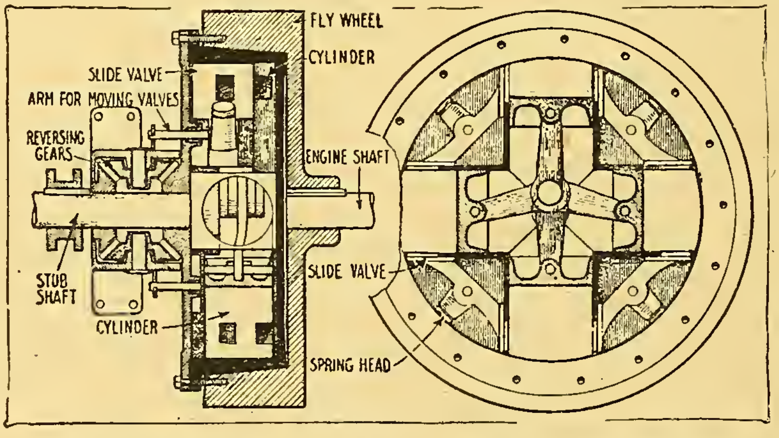
An Article describing a Simple Form of Hydraulic Transmission.

THE infinitely variable gearless change speed has been an inventor's ideal ever since motor vehicles were permitted to run on the English roads, and for this reason the friction transmission has received a great deal of attention both by car and motor cycle designers.

There is another form of infinitely variable change speed—the hydraulic clutch—of which one type is illustrated here. This is an invention intended to replace the clutch of a car, but, excepting the embodiment of a reversing gear, the same application of hydraulics could be utilised on a motor cycle. The entire device occupies but a little more space than the internal part of the standard clutch, which it displaces, as no friction clutch is necessary with this invention.

The drawings give a comprehensive view of the device, as all of the elements are shown in the two views. The body of the device is a cylindrical shell, the perimeter of which fits the standard clutch element inside the flywheel. This is held in place either by friction or by means of capscrews, so that it is permanently fixed to the wheel.

The rear side of the shell has a removable plate, to which the mechanism for changing the speed is secured on the inner surface. Within the shell are four radially-disposed cylinders, each cylinder having within it a piston, suitably packed with rings, following the usual practice. The stub-shaft, which enters the rear plate of the shell, has a single crank to which the four connecting rods are secured, so that the pistons have a successive motion to and fro as the shell turns.



An interesting hydraulic transmission system replacing the clutch, and providing an infinitely variable gear ratio.

The head, or outer end, of each cylinder has ports on two opposite sides, the outer surface of each cylinder, along the ports, being planed flat and covered by slide valves, which move axially, or parallel with the stubshaft. The valves are L-shaped, and provided with suitable openings to co-ordinate with the ports of the cylinders, each valve being designed to open or close the ports of two adjoining cylinde To effect this, each L-valve has a stem that pass through the removable plate of the shell, the ou ends of these stems being rigidly attached to a r which, although it turns with the shell, is neverthele easily adapted to connect with an operating lever.

It is obvious that, as the cylinders are rigi attached to the shell, the stubshaft will not tu if oil be permitted to pass freely in and out the cylinders. The only effect in such a case wou be to produce a reciprocating motion of the pisto When, however, the driver of the car moves forwa the lever the L-valves are caused to travel inward and the ports of the cylinder are closed, the pisto are restricted in their reciprocal motions, and t shaft turns, the rate of speed, relatively to the engi speed, being dependent on the quantity of oil which displaced at ea revolution. If t ports are entire closed, then t stubshaft will tra at the same rate speed as the engi shaft.

It is claimed th there is no appre able loss of pow and the sligl amount of oil whi escapes past t valves imparts resiliency, or fle bility, comparat to the electric magnetic driv If employed for motor cycle the would not be a single gear wheel in the mechanis

In hydraulic systems the cases containing t mechanism must be entirely filled with oil, or with t liquid used to provide the transmission. In t invention the pistons are just as effective if the sh is half filled, for the reason that the ports are at t outer ends of the cylinders, and as the shell revolv the oil is thrown outwardly by centrifugal force, that the ports are always submerged in oil a are capable of taking a full charge without drawi in air.

Fully half of the cubical contents of the shell m be devoted to air, or a partial vacuum may be form therein, thus taking care of any undue expansion.

OCCASIONAL COMMENTS

BY "IXION"

The Cycle Car Coming.

I HAVE repeatedly asserted in this column that aero engine practice has rendered a good cycle car possible, but that the reluctance of directors to br k out a new policy still renders the production of a ıss vehicle by a class firm improbable. A designer w se big cars are famous all the world over writes to orrect me. His post-war cycle car is already in e tence, so far as the parts and their individual tests ar concerned. Road tests of the complete chassis ar about to commence. The vehicle is in no sense c ventional, and is designed to compete with the side o it de luxe so far as price and road performances a concerned.

A Four-cylinder Caveat.

I WONDER if the riders who try to "boost" the four-cylinder realise that the overhaul of its bearings requires considerably more skill than a si ilar job with a simpler engine, and that the cost is i proportion. Similar reasoning applies to spare p ts. The cost of material is trivial, where the small d ails of motor cycle engines are concerned: and the c t is based on labour, including actual machining, s rekeeping, etc. For example, there is practically n difference between the cost of a new piston ring f a Wall Auto-wheel engine and one for a 260 h.p. rcédès. So the piston ring bill included in the c rhaul of a single-cylinder engine may be three or f r shillings, but for a four-cylinder it will approach sovereign. Other parts are multiplied in the same io, and where the number of parts is the same in h cases, *e.g.*, a crankshaft, the cost does not remain ual. Now motor cycling is a sport with a very rrow cost range, so far as the user is concerned. ly a very marked technical and practical superiority ll persuade motor cyclists to multiply their repair d replacement bills by four, if multiplying them by o (*i.e.*, plumping for the flat twin) will do almost as ll. I think this factor may count for quite a lot. is not true that a four-cylinder gives us twice as uch trouble as a twin, and four times as much uble as a single, but it is true that in some respects is emphatically more expensive to maintain.

Another Generalisation.

THE other day I had to guard myself from a charge of lumping all D.R.'s and all M.T. men together. I now wish to challenge the many atements which dump all munitioners in the same sket. A common method of payment in munition ctories is a combination of piece and time rates. A nd performs one operation on a shell. A time is ed for that operation, say five minutes. He is paid much an hour, and his time is reckoned by the mber of shells on which he performs this operation. he gets through twelve shells he is paid for one hour, twenty-four shells two hours, and so on. The high wages now current are very often based on the fact that a very liberal time is allotted for each operation, partly because individuals vary so much in their speed. A quick worker possibly machines three shells in the five minutes allowed for one shell, and so gets three hours' pay for each hour's work. Individuals and factories vary enormously in these respects. Of course, the time allowed for stereotyped operations on stereotyped munitions, such as eighteen-pounder shells, is now pretty well standardised, but there are still a lot of odd jobs going through some of the smaller factories and some of the experimental works, and here the contrasts between patriotism on the one hand and laziness or covetousness on the other are extraordinary.

Some Examples.

FOR instance, there are factories where the machine hands, in co-operation with the charge-hands and the foremen, have fixed the time allowed for each operation at the absolute minimum, and nevertheless work like demons. In such a shop we get a maximum output at a minimum cost. In another shop we find an absurd period allowed—perhaps forty minutes for a fifteen-minute job, coupled, however, with a fast rate of working and no dawdling. Here we get a good output at very high cost, each hand being paid double time and over. In a third shop we find fifty minutes scheduled for a ten-minute job, and a conspiracy to make things very uncomfortable for anybody who "cuts it up," *i.e.*, earns more than "double time." So you cannot estimate the patriotism of a munitioner at sight. He may be wrecking his health by working long shifts, with hardly any holidays, at high pressure, and for less than half the pay which he could secure if he and his shopmates were lazy wanglers. Or he may be a born-tired grafter with no conception of patriotism. Or he may come betwixt the two. Human nature, in the army and out of it, runs in streaks.

Overhead Valves.

IT is now possible to construct an overhead valve which can be guaranteed not to break: nor are such valves either fat or heavy. The other day I saw a pilot preparing for a tolerably dangerous flight with a big engine equipped with o.h.v. which looked quite absurdly fragile, and no provision was made for preventing them going through the piston if a stem snapped. It will be interesting to see whether this valve position is adopted on motor cycle engines in the near future. On the one hand, overhead valves offer us an increased efficiency; on the other, they will be less accessible than the side pattern, and do not lend themselves so conveniently to tank design.

THE BRITISH MAGNETO.

A SURVEY OF THE WAR-TIME WORK OF A NEW INDUSTRY.

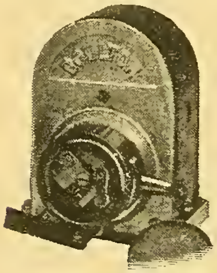
Thomson-Bennett magnetos for large singles, flat twins, and V type engines.

Types of M-L magnetos for lightweights, 3½ h.p. singles, and flat twins.

IT is safe to say that nine hundred and ninety-nine out of every thousand motor cycles are fitted with magnetos, but it is extremely doubtful whether one rider in every thousand has the same knowledge of the ignition apparatus as he has of the rest of the machine.

The majority of present-day riders were not motor cyclists before the high-tension magneto changed the question of ignition from one of great uncertainty to one of almost absolute certainty. To many the magneto is there—sometimes in a most exposed position—as something that does its work with such unfailing regularity that it passes from the ken of mechanics in the mind of its owner. It has no valves to grind, no jet to be opened out or hammered up, no cylinder to be decarbonised, and no tappets with which to tamper. It is just a thing which is understood to go round and to make a spark at the moment it is required to ignite the charge in the cylinder. Yet before its advent the ignition was the most troublesome part of the motor cycle. To-day it is the most reliable. To the efficiency of the high-tension magneto is largely due the enormous developments that have taken place in the application of the internal combustion engine to industrial, pleasure, and war purposes.

The P.M. magneto for single-cylinder engines.

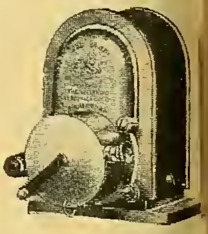


The Boulton magneto for single-cylinder engines.

Since the magneto is of such importance in the world of automobile engineering, more should be known by the individual concerning its construction, the principles upon which it works, and the firms who came to the rescue of a stranded nation when war broke out. Because a thing rarely requires attention it does not deserve less interest than the parts of a machine which periodically call for adjustment. For several years before the war this journal urged that more magnetos should be made in this country.

The necessity for this was made manifest when w broke out. It was poor consolation for us to be ab to say, "We told you so." It is far greater pleasu for us to note the magnitude of the British magnet industry now so firmly established. This new industr has filled the gap which threatened to handicap o forces in the field. It has done more. The Britis magneto of to-day is a far superior instrument to th pre-war product from Stuttgart.

One must remember that in 1914 the ou put of British-made magnetos was abou 100 per week. This means that a Britis magneto industry did not exist, for one two small firms could not be regarded eve as the nucleus of an industry. A new i dustry had to be created, and the deman upon it was immediate. It was necessa to produce magnetos *at once*. Several firm stepped into the breach and magnetos wer produced, and, in justice to them, w should realise that had they been given time, the products would have been better than they were. Th result was only to be expected. The earliest British magnetos did not give the same satisfaction internal combustion engineers had obtained from foreign machines that had taken twenty years to develop.



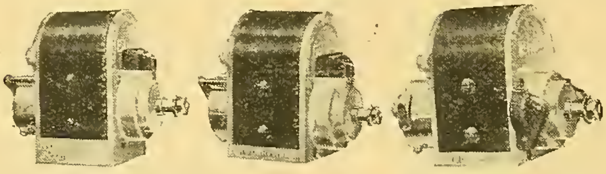
The Lion magneto, a type for single-cylinders.

Early Efforts.

Without proper tools, without suitable material, without very complete knowledge of the problems no one had troubled to overcome before th war, the infant industry had endeavoured to "delive the goods," produced in workshops instead of labora tories. At the best an imitation, a substitute.

These were the magnetos upon which are based th deprecation of those who still regard Germany as th home of the magneto.

Since the manufacture of these machines the Britis magneto has undergone a great change. It is no

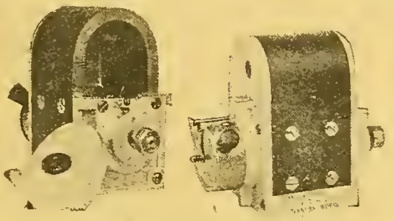


E.I C. magnetos for large single, two-stroke, and twin engines.

A group of B.L.I.C. magnetos for varying types of machine.

T British Magneto.—

oratory produced, a scientific instrument rather tn an engineer's machine. Merely to copy is to do ny things without knowing the true reasons therefor. hose reasons no longer are secrets and undefined ories. Ceaseless work in laboratory, in workshop, foundry, in organisation, has relegated the "best" yesterday to the limbo of forgtten things.


The B.T.H., a type of magneto for single-cylinder engines.

At first the importance of the estion of obtaining the special grade steel for the magnets was not ficiently appreciated. It was diffilt to obtain when its importance s realised, but the matter was ercome by the steel makers of effield, with the result that, from is point of view, the British magto is superior to the German article.

There were other problems, one by one overcome, til to-day no one can say that the home of the magto is in an enemy country.

The Result.

Up to the present time the British magneto industry, ung in years but now old in experience and knowdge, has supplied hundreds of thousands of magtos for war purposes, and as the magneto is the real art of an engine, the fact that our army aeroplanes, nks, lorries, cars, cycles, and naval motor boats and rships are equipped with the home-made article, is fficient proof that England has made good in a field quiring more than the average scientific and elecical knowledge. The eory of Bosch infalliility has been exploded.

A group of C.A.V. magnetos designed for varying types of motor cycle.

The capital now inested in the British mageto industry is approxiately one million pounds, nd it gives employment o 5,000 people, not inluding those engaged in he subsidiary trades.

Apart from the magnetos made for aeroplanes or ars and marine purposes, there are over twenty models tandardised for motor cycles. These include four akes of magneto for single-cylinder lightweights, hree for small flat twins, one for small V twins, five or medium-powered singles, two for large flat twins, two for large V twins, and one for small four-cylinder engines.

The makers of the above mentioned instruments are scattered all over the country, and are as follow: British L. M. Ericsson Mfg. Co., Ltd.; British Thomson-Houston Co., Ltd.; British Westinghouse Elec. and Mfg. Co., Ltd.; E.I.C. Magnetos, Ltd.; M-L Magneto Syndicate, Ltd.; R. B. North and Sons, Ltd.; Thomson-Bennett Magnetos, Ltd.; and C. A. Vandervell and Co., Ltd.

In addition to the above firms, who all belong to the British Ignition Apparatus Association, a body formed for closer co-operation of the industry, there are several other makers deserving of mention. These include: The British Lighting and Ignition Co.; Fellows Magneto Co., Ltd.; Messrs. Boulton; the Britannic Electrical Co., Ltd.; the Stentaphone Co.; and the Runbaken Magneto Co.

While "design" probably is the most important item in the production of a magneto, "method" undoubtedly is also very important, as proved by the fact that some of the earliest British copies of the foreign product were not quite equal to the originals, although made exactly the same as some of the foreign machines and of the same dimensions.

Advantages of Co-operation.

There is no doubt now that the British magneto industry can produce sufficient magnetos for the motor cycles which will be built in this country after the cessation of hostilities, nor that their quality will be below the high standard of perfection the trade and the rider demand. Experience has shown that to be successful a magneto must be efficient in design, extremely accurate as regards workmanship, and constructed throughout of special material. The British firms engaged in producing magnetos fully appreciate these facts, and the post-war magneto will be neither makeshift nor imitation, but the outcome of extensive experimental and research work of the magneto industry as a whole, for war has shown that the principle of co-operative action on the part of makers—exchange of ideas and discoveries among the best electrical brains in the country—has far greater value than for each individual to plough his lonely furrow.

THE GOVERNMENT AND BRITISH MAGNETOS.

IN the recent report of Lord Balfour of Burleigh's Committee, the suggestion was put forward that for three years after the war the Government should stipulate in all contracts for British magnetos.

The licence proviso would seem to be due to the objectors of the War Office, who hold that the Government must not be deterred from buying "the most efficient ignition apparatus from whatever source." There is not the slightest question that the most efficient magnetos in the world to-day are British-made. One frequently hears the unthinking ruminating on the possibility of Germany having some super-production for after the war. A moment's thought should convince anyone that Germany's finest and most recent designs would find their way on to their fighting aeroplanes. British manufacturers are soon acquainted with any new enemy device which may be worth investigation, and, such being the case, the suggestion that Government Departments should for three years stipulate in their contracts British-made magnetos seems the very least they could do to stimulate and keep buoyant this healthy and young industry in the face of the strenuous efforts Germany will be making to regain her supremacy in the magneto world.

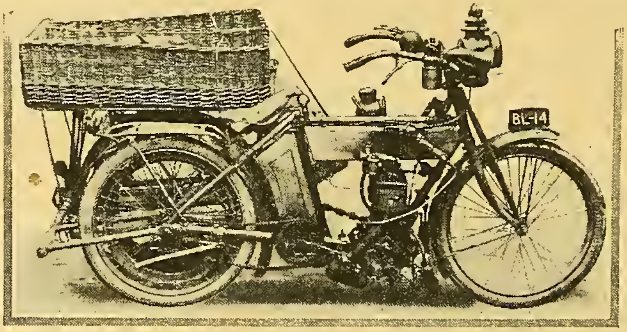
THE FLEXIBLE SIDECAR IN ENGLAND.

An Ancient Fourteen-year-old Rex fitted with a Sidecarrier designed Twelve Years ago and still "going strong."

IN the early part of this year there appeared in *The Motor Cycle* an article on the development of passenger motor cycles, in which it was stated that the flexible sidecar no longer flourished in this country. The subject was taken up by an American correspondent, and in the issue of March 28th a further article was published describing a flexible sidecar which hailed from the U.S.A. Recently we received a letter from a well-known pre-war Swift rider, F. J. Watson, who is at present in the R.A.F., suggesting that we should call upon a friend of his, Mr. E. W. Gascoyne, of 15, South Row, Westbourne Park, London, W.2, who has been using a vehicle of this type for many years.

Mr. Gascoyne is engaged in the laundry trade, which, as most of our readers are aware, entails the use of a certain amount of machinery, and having a liking for things mechanical, he set himself many years ago to build a flexible attachment to fit his 1904 Rex motor bicycle. This he has improved until it has reached a really practical stage, and he also added many useful fittings of his own to the motor cycle that has served him so well.

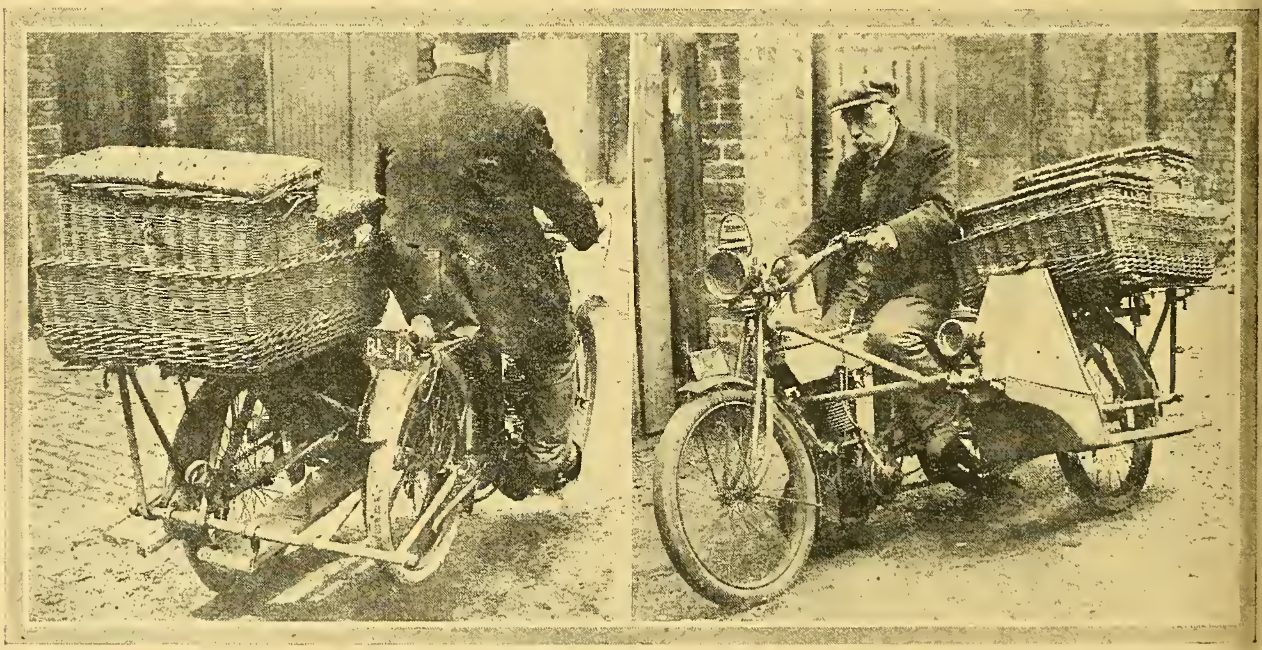
Originally the machine was fitted with a surface carburetter and the Rex Company's beehive silencer. Both these were abolished, and the engine is now fitted with a spray carburetter, and the beehive silencer is blocked up, a new outlet having been made and an ordinary exhaust pipe and silencer fitted. The frame has been considerably lowered, and the head has been strengthened by an additional tube and lugs, while the saddle has been placed in a reasonably low position. Fitted with magneto ignition and a two-speed gear, the brave old machine is now able to take its rider and a load of laundry baskets anywhere.



The modernised 1904 3 h.p. Rex, fitted with a flexible sidecarrier. A new silencer, magneto ignition, and a modern carburetter replace the old fitments.

Originally the sidecarrier was fitted with pedalling gear, a saddle and extra handle-bars, so that before the improvements were made to the motor bicycle—and it had not so much power as it has now—the passenger could assist the driver by pedalling to start and up hills. Mr. Watson writes: "I remember many a ride on the machine when I was a member of the West London Cycling Club, and was paced by the combination on such events as the London-Brighton run."

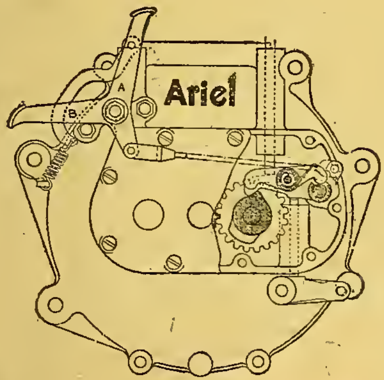
Later on the pedalling gear, saddle, and handle-bars were removed, a front wind protector was erected, a comfortable seat took the place of the saddle, and footboards were substituted for the pedalling gear.



(Left) Taking a big boulder. Note that both motor cycle and attachment remain vertical. (Right) Mr. Gascoyne negotiating a corner

EASY STARTING
OF THE
ARIEL MOTOR CYCLE
GUARANTEED

The easy starting of the Ariel is specially mentioned in nearly every letter we receive from owners. The following are a few extracts selected at random.



The Ariel (Patent) Decompressor.

A simple mechanical device—absolutely positive in action—nothing to get out of order. To bring the decompressor into operation the front lever (A) is placed in the forward position, and the rear lever (B) pressed down to bring the engine under full compression.

"Even on to-day's so-called petrol, mine starts at first kick."—W. D. W., Redbourne.

"The other night the bike was left out from 12 a.m. till 8 a.m. in a perfect rain storm. When I got to her in the morning she started up with the first kick."—
Dr. G. H., Shetland

"It is easy starting and most powerful on hills."—B. S. W., Stowmarket.

"I find the easy starting a great comfort."
—Dr. D. M. H., Bolton.

"The easy starting decompressor is a revelation."—A. B., Ulverston.

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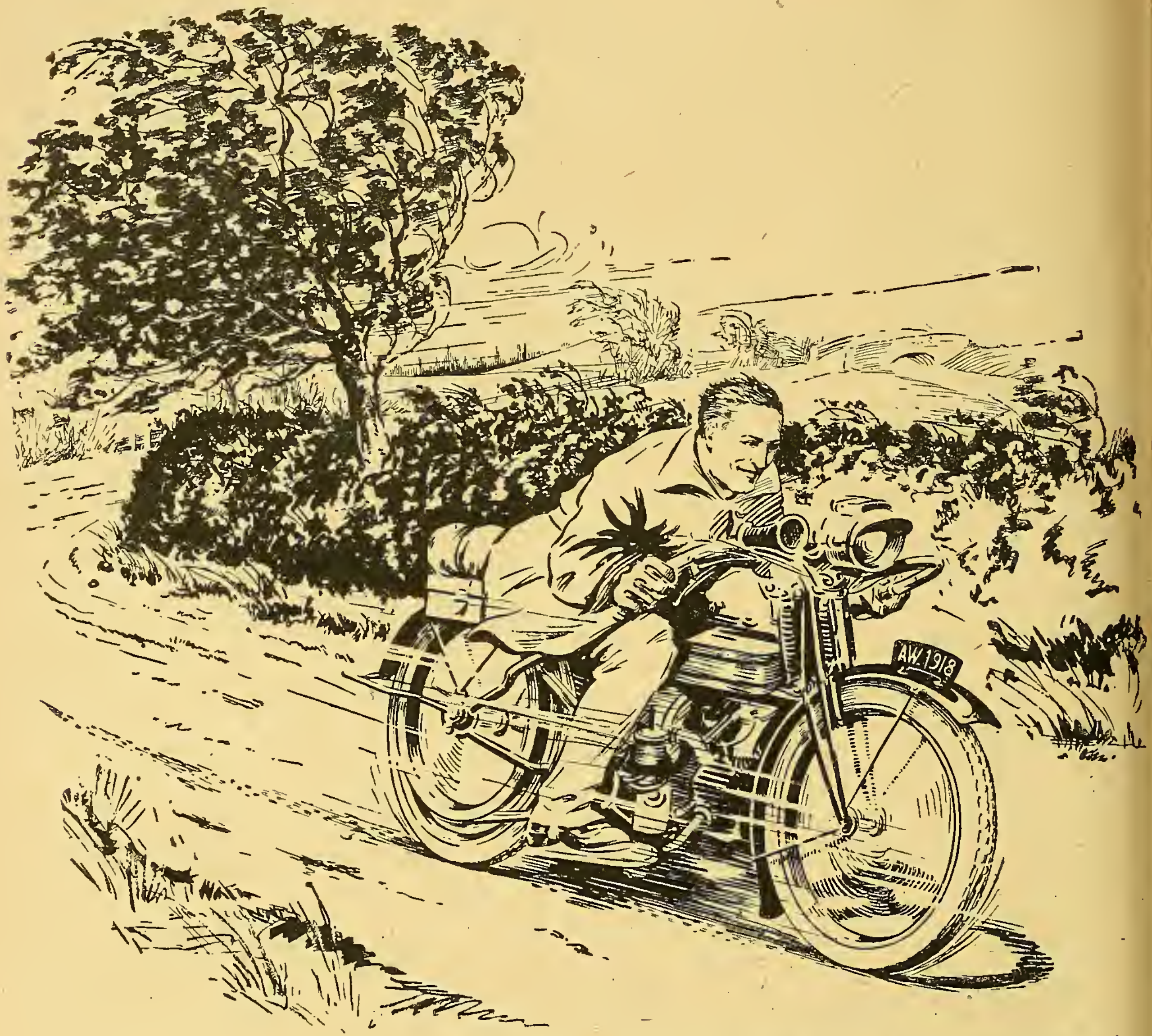


LET me ride with the wind on my forehead,
The beat of the air through my hair!
Let me face the rush of its passing—
The open, sweet, God-given air.

Let me face the wind in the evening,
Let its coolness revive my soul;
Let me pass from the glare of the pavement
To places where God makes men whole.

Let me feel the wind on my temples
When I answer the Last Great Call;
Let my spirit go out in a windstorm,
Clean, pure, on my last ride of all.

DUNLOP
RUBBER CO., LTD.,
Founders of the Pneumatic Tyre Industry.
Para Mills, Aston Cross, Birmingham.
London: 146, Clerkenwell Road, E.C.1.
Telephone: 5375 and 5376 Holborn.

he lexible Sidecar in England.—

ne rear view of the machine shows that the comition can take quite a large size bump without nt fering with the level of either sidecar attachment r icycle, both remaining vertical, and another photo-gr h illustrates that when turning a corner both ions bank over just as in the case of a solo mount. t the present time a tray is fitted to the attachment n lace of a seat, so that Mr. Gascoyne's laundry ets can be conveniently carried, and the machine s ow used solely for this purpose.

The Method of Attachment.

he rear attachment to the motor bicycle is made ugh forks swivelling on the back stand bolts, while ear bar is threaded on to a liner tube which runs right through; the front attachment comprises a movable joint made by placing two ball races together secured by double lock nuts. The cross tube from the saddle bolt to the frame, which is usual in sidecar construction, is not employed, but two tension springs take its place, and serve to keep the vehicle upright when stationary.

Negotiating Sharp Corners.

The photographs show clearly every aspect of this interesting machine, while one demonstrates the combination being ridden round a sharp corner by its gallant owner, who is sixty-two years of age. The Rex motor bicycle is fourteen years old, while the flexible sidecarrier depicted is no less than twelve years old, and both are good for many years of service.

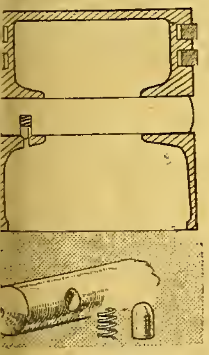
FIXING THE GUDGEON PIN.

Some Remarks on a Motor Cyclist's Bugbear.

I' would be a real boon to motor cyclists if some degree of standardisation were arrived at in the fixing of gudgeon pins. It should be possible in ry design to remove the piston from the connecting as easily as one removes a sparking plug, yet how ny engines have been scrapped or very seriously ured owing to the inaccessible fixings now in use— v many knuckles have been barked in a perspiring l irritable attempt to remove some wretched little ter from the inaccessible and invisible interior of ord the piston? In one notable example of sent-day design a special tool is necessary to get at locking screw of the gudgeon pin. To secure the ew without the use of this special implement is a tter of uncertainty, and in one depot in France, ere a number of these engines are in use, several akages have occurred owing to the locking pin rking loose and falling into the crank case—the ecial tool not being obtainable. Now, when an ificer has occasion to remove a piston he shortens gudgeon pin somewhat before replacing it, and es a thick copper washer at each end, the use of the ccessible locking screw being avoided.

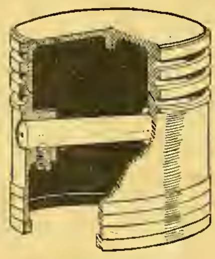
Other Systems.

We have certainly suffered some inflictions with ard to gudgeon pin fixings. First, there is the tapered gudgeon pin, requiring a tap with a hammer to fix it. This system is preferable as regards accessibility to the internal fixing screw, but one seldom knows which way to tap it, and cracked pistons often result from too liberal a use of the hammer. Moreover, the arrangement is not good, for the taper pin is apt to cause the piston to warp —a thing it is ever ready to do without special encouragement —and in careless hands the connecting rod is apt to be strained while removing or replacing the pin.



A gudgeon pin fixing nce adopted by the nakers of a well-known ingle-cylinder engine.

The gudgeon pin, then, should be a sliding fit in the piston, hence the adoption of the various internal locking gadgets. The makers of a well-known single once employed a small internal spring lock, as shown in the sketch—an arrangement which, I sincerely hope, this otherwise excellent firm has since abandoned. The gudgeon pin was drilled to carry the spring and the small shell lock, which, when it arrived opposite the hole drilled to receive it in the piston boss, sprang into position, thus locking the gudgeon securely in place. To remove it a bent spoke and endless patience were required, and very often great difficulty was experienced in inducing it to register. This system, however, was absolutely safe, and excellent in many other respects, its one fault being its inaccessibility. Other systems are equally inaccessible, and in addition unsafe, and the question naturally arises—why employ such systems when, by an absolutely obvious means, perfect accessibility and safety can be acquired? Manufacturers are apt to forget that the ordinary user has to work on his engine while it is in the frame—that he has not the whole thing open before him on a bench with an assortment of special tools for each particular job—and in consequence should study these small but important details.



A gudgeon pin screw designed to be secured by a split pin.

The Piston Ring System.

It will probably go undisputed that the piston ring method of fixing the gudgeon pin is the best. There are other excellent methods, but none quite so obvious at first glance. The ring need not function as more than merely a locking for the pin, so that it might be more easily removed than the rings at the top of the piston designed to hold compression. The locking ring cannot very well assist in holding compression, and if a spring fit inside the cylinder it would merely tend to increase friction. It need, indeed, be nothing more than a spring clip. CHINOOK.

CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

May 16th	... ...	9.13 p.m.
,, 18th	... ...	9.16 ,,
,, 20th	... ...	9.18 ,,
,, 22nd	... ...	9.21 ,,

National War Funds.

National Relief Fund (distributed £3,839,653) ..	£6,362,290	0	0
Red Cross Fund	10,565,811	9	7½
Tobacco Fund	152,940	0	0

Deserted Roads.

During a cycle ride of over eighty miles at the week-end on Midland roads, one of our staff saw only three cars and not a single motor cycle.

Price of Petrol.

On May 1st the wholesale price of petrol was raised 2½d. per gallon. This advance was considered necessary in order to cover the increased landing cost of petroleum products in the United Kingdom.

A Correction.

Last week, in a paragraph relating to "Industrial Reorganisation," we referred to Messrs. W. A. Bates as the makers of John Bull tyres, whereas these tyres are manufactured by the Leicester Rubber Company.

Stolen Motor Cycle.

Lt. C. A. S. Thornton, M.G.C., Grantham, writes to say that his motor cycle was stolen on May 9th. The machine was a 1915 three-speed B.S.A., T.T. handle-bars, speedometer, horn, lamp, generator, chain-cum-belt drive, the registration number being FC 2227.

D.R.'s and the Liberty Engine.

It has been rather amusing to hear the opinions passed on the new "Liberty" motor cycle by despatch riders who happen to be W.D. Douglas enthusiasts. They do not depreciate the machine in the slightest, but they are emphatic in their assertion that *they* would not like to be confined to a big twin for all classes of work.

Appreciation of a Gallant Airman.

We note with pleasure that His Majesty the King has shown his interest in the commemoration of the work of the late Capt. Albert Ball, V.C., of Nottingham, by accepting a copy of the volume recording the salient features of Capt. Ball's achievements. One of the authors of the work has received the following in a letter from the King's secretary: "I am to assure you of His Majesty's appreciation of possessing this interesting record of the life of a gallant officer of such renown as Capt. Ball."

Special Features.

BRITISH MAGNETOS.
A VARIABLE CHANGE SPEED
A FLEXIBLE SIDECAR.

Shaft Drive.

Judging from the correspon columns of American motor journals, the interest in shaft dri steadily increasing in that country.

"Osten-d-tatiously Vindictive."

We have received a postcard from W. Starley, whose name is well-k to many of our readers as a p inventor of motor cycle improvem which shows that he has developed a patriotic punster. He says: "Ho to the *Vindictive.* Though lost to s she is Osten-d-tatiously Vindictive s

Editor of "The Aeroplane" Summon

Mr. Charles G. Grey, editor of *Aeroplane,* was summoned, with Aeroplane and General Publishing Ltd., to appear at Bow Street on Mo last, accused, on the information of Director of Public Prosecutions, of lishing, without lawful authority, i mation with respect to the place manufacture of aeroplanes, contrar the Defence of the Realm Regulatio

Major-General Sir Stanley von Donop inspecting the motor cyclists of the East Yorkshire Motor Volunteers at Hull last week after a mobilisation test. A.J.S., Triumph, and New Hudson sidecars are shown in the photograph.

ng and no petrol is worse than
and no spring.

en.

is the pet name given by Hender-
vners to their mounts.

c v. Car.

ly times it has been demonstrated
a sidecar outfit with a correctly
ucted pillion seat or a double-seated
r will carry three people more com-
ly than the average small light car
with a dickey seat.

s.

notor cycle is all "machine" except-
he saddle. Is this the reason why
makers leave the comfort-providing
nts to an outside maker? Closer
eration between saddle makers and
cycle manufacturers should result
eater comfort.

l Carrying.

ere is manifestly a special providence
me motor cyclists. A day or so ago
aught sight of such a one careering
with the complete back wheel of an
n "secured" to the carrier by a piece
tigued looking string. The wheel
swinging about most dangerously,
creating a furious clatter, but the
was blissfully unconscious of any-
unusual.

l Consumption Trials in U.S.A.

ere is no surer sign that the petrol
age is genuine than the fact that
rican clubs are holding petrol con-
tion trials. A few years ago the
rican motor cyclist troubled little
her his machine consumed a gallon
every forty or every thirty miles.
solene," as they call petrol over
, was cheap enough, and there was
eat outcry when the price went up
cents (almost one shilling) per gallon.

Indian Chief's Good Work in Paris.

r. George M. Hendee, we understand,
present in Paris directing the postal
ce of the Y.M.C.A., where a very
number of Americans have their
espondence addressed. He has relin-
hed all active interest in the Hendee
and is serving voluntarily in the
rôle of postmaster. We wish him
y success, and congratulate him on
disinterested action in volunteering
assistance for the Allied cause and
Y.M.C.A. in particular.

acuum.

e are asked to explain what causes
"suction" on a piston when it is
ed down a cylinder and creates a
um. Our puzzled correspondent
ts out that in a perfectly sealed
el the movement of the piston only
an inch would create a vacuum which
othing, and wants to know whether
vacuum is "stretched" when the
on is carried, say, half a dozen inches.
answer lies in the fact that it is not
vacuum that causes suction, but the
sure of the atmosphere (approximately
b. per square inch) on the underside
he piston tending to press the piston
. In other words, there is a pressure
5 lb. per square inch on one side of
piston and nothing on the other.

New Distinguishing Mark.

To the already numerous registration letters of cars and motor cycles for the London district LU has been added.

Two-stroke Lightweights on War Service.

It may not be generally known that a large number of Triumph two-stroke lightweights are in use by His Majesty's Services Overseas.

In New Zealand.

According to Mr. J. B. Clarkson, the well-known motor dealer of Wellington, N.Z., the motor cycle business in New Zealand has improved very much during the past twelve months.

Fords and Motor Cycles in the Colonies.

In New Zealand an American 7-9 h.p. motor cycle costs approximately £100, and a Ford car is nearly double the price. A British single-cylinder of well-known make is sold for nearly £100. In Australia the disparity between the car and the motor cycle is even greater, although the prices of the motor cycles are higher than in New Zealand.

"'Tis an Ill Wind——"

"'Tis an ill wind that blows no one any good," a motor cycle manufacturer said to us the other day. "Before the war we were pestered to death by snippet hunters from the motor papers. Now—well, we are resting." Such are the thanks the motor cycling journalist receives who in normal times hunts for news to interest the readers of *The Motor Cycle.*

Rough Rider Grips.

It is a matter for surprise that those American "rough-rider" grips have not caught on more in this country, especially in view of the state of the war-time roads. A springy core projects beyond the metal of the handle-bar, and its flex is a great saving to the wrists, to say nothing of the convenience of the knobbed end, that adds to the security of the grip. A lightweight is greatly improved by these fitments, as we can certify after 3,000 very bumpy miles with them. Occasionally it is necessary to bend the handle-bars upwards and outward slightly (if they are T.T. pattern), but this can be done cold, and is often a great improvement.

What's in a Name?

American motor cyclists appear to enjoy the distinction of being a race apart if their names stand for anything. "Bud," "Tad," "Ed," "Rube," "Art," "Jake," and "Van" are only a few of the many peculiar curtailed names they adopt.

A Motordrome?

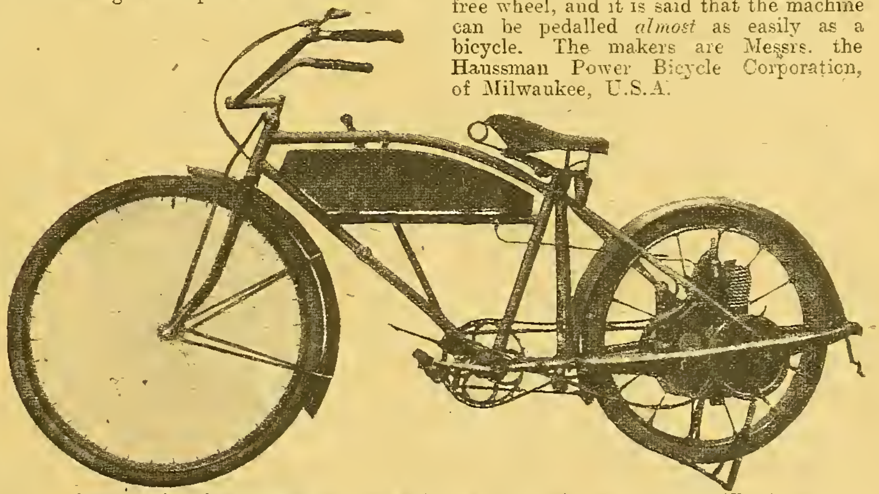
A few years ago a project was afoot to build a motordrome in the Midlands. If track racing is to become popular in this country such a track as was suggested is very necessary. Even the old cycle tracks are disappearing one by one, and while these were not suitable for very high speeds, a certain amount of lightweight motor racing was always regarded as a "draw" by cycle sports promoters. Brooklands is too far away from the Midlands to attract the sporting public, who would attend a track nearer home in thousands.

An Early Morning "Blind."

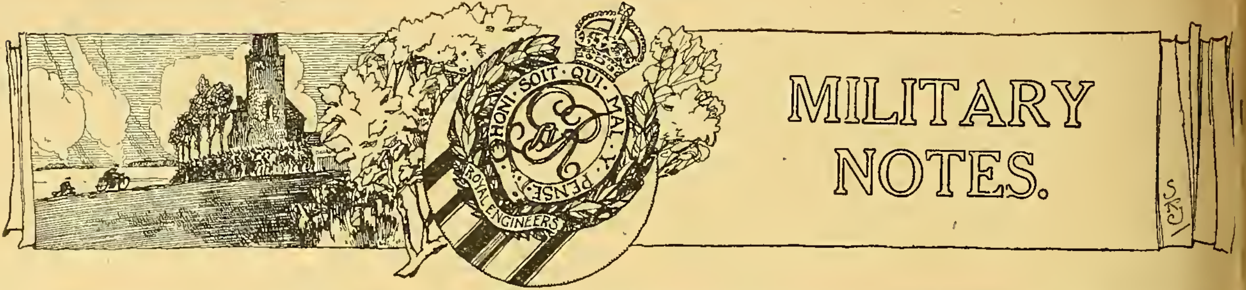
A motor cyclist in the Midlands, who finds himself with petrol but no permit to use it, recently rose with the dawn and enjoyed a thirty-mile "blind" along the deserted roads. It is stated that he was prepared to pay for infringing the law after his "joy ride," but it would have gone against the grain to be summoned for pottering at normal speeds. No doubt the spin benefited the rider; but it must not be forgotten that the police never sleep, and the early morning spin may result in a prosecution just as easily as one undertaken in the middle of the day.

A Weird-looking Lightweight.

On this page we illustrate America's latest effort to produce a lightweight motor cycle, and, to the English eye, the result is a hybrid. It is known as the Haussman, weighs 110 lb., and consists of a Smith engine built into a 24in. rear wheel with ¼in. steel spokes. The spokes are "off-centred" so that the weight of the power unit is carried in the centre of the wheel. It will be noted that the frame is of peculiar construction; but, to our eye, does not justify the American description as following "graceful, motor cycle-type lines." A free engine clutch, hand-operated, provides an absolutely free wheel, and it is said that the machine can be pedalled *almost* as easily as a bicycle. The makers are Messrs. the Haussman Power Bicycle Corporation, of Milwaukee, U.S.A.



A recent American production described as a "graceful" motor cycle. The frame design speaks for itself.


HONI SOIT QUI MAL Y PENSE
ROYAL ENGINEERS

MILITARY NOTES.

Discharged Men and their Pensions. Experiences with Commissariat in East Africa.

AN UNUSUAL CAUSE OF DELAY.

THE Postmaster-General states that mails from soldiers in Palestine have been delayed by a landslide.

DISCHARGED MEN'S SAFEGUARD.

THE Minister of Pensions states that discharged men need have no fear that because they undertake regular work, and earn the highest possible wages, their pensions will be reduced. Instructions have been issued to Medical Boards definitely forbidding the questioning of men regarding their earnings.

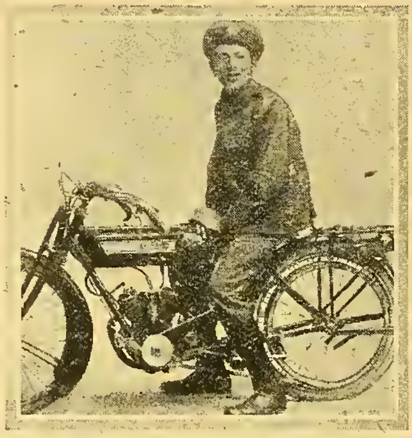
THE GAS BAGS IN ENGLAND.

CPL. KESSELL writes us from Mesopotamia, and sends us a photograph which was taken whilst the Cossacks were in that country. He says: "We who have been out in this part of the world so long are greatly amused with the new additions to motor cycles in England—*i.e.*, gas bags. I dare not think what would be the result had we to use such cumbersome devices on active service in this country. You will notice that our mounts are 1916 Triumphs, and both Cpl. Johnston (Winchester) and Cpl. Kessell (Whitehaven) are confident that they are the only machines that would stand up to the rough work amongst the hills, with which this particular division has to contend."

SEC.-LT. J. H. POUNTNEY.

SEC.-LT. J. H. POUNTNEY, A.S.C., M.T., will be remembered by our readers as one of the foremost Rover exponents in pre-war days. At the outbreak of war, he was one of the first group of motor cyclists to be enlisted by the Editor of *The Motor Cycle* for the No. 5 Battery of the Motor Machine Gun Service—familiarly known as the Coventry Battery—and was quickly promoted sergeant. After three years' service abroad he has been granted a commission in the A.S.C., M.T., and expects to return Overseas at an early date as workshop officer to a Supply Column.

Lt. J. H. Pountney, A.S.C., M.T.



Pte. E. C. Jennings, who, after serving in France, is now in hospital. Before the war Jennings was an enthusiastic owner of a twin Humber, upon which he is mounted.

EAST AFRICAN EXPERIENCES.

WE have received from Pte. G. W. Clark, who is with the East African Expeditionary Force, an interesting letter describing his experiences in that country.

He says: "After nearly two years' campaigning, I am amazed at what an ordinary single can accomplish if well looked after. I have been attached to the S. African D.R.'s for three months, and so had a chance to judge their performances. You will hardly be able to conceive the awful tropical conditions here, the lack of roads and bridges, and labour entailed on most of the journeys undertaken, which necessitate the carrying of rations, cooking pots, blankets, spades, petrol, tubes, etc. A two hundred mile journey is a common one, and this through bush and past an occasional nigger kraal, where, if one understands the lingo, eggs, chicken, fruit, etc., can be obtained. The eggs had to be consumed on the spot, or else an omelette in one's haversack was the result of trying to bring them to camp. I am afraid the chicken, which we often carried suspended by a string hanging down one's back, had a very rough journey.

"The machines were all B.S.A.'s, and the way they took hills and gulleys was truly marvellous. The chief troubles experienced were broken rims, spokes, and saddle parts.

"For some time I have been driving a car, which is bad enough, but was a luxury compared with motor cycling.

"I am sending these few notes to the people at home know there is campaign here. We hear and read big sums being subscribed to send co forts Overseas, also papers and ma zines being collected to send to fight men, but in nearly two years' servic have received only one such comfort, a as regards reading material we sim cannot obtain any. We have now clea the Huns out of the Germans' l colony, and hope soon to be back in d old Blighty."

HOW THE WAR MAY END.

THE opinion has been passed that t war will end in consequence of t demoralisation of Western Germa The enemy will sue for peace wh squadrons of over 200 aeroplanes bo the Rhenish towns weekly. Such happ ings may occur if the American prom of thousands of aeroplanes is kept.

BOY PILOTS.

IT is said that young and expert mo cyclists having technical knowled make the best pilots, and we wish t best of luck to Alex. Auerhaan, the s of Mr. Auerhaan, of the Triumph Cy Co., who in this direction will be w equipped for his new sphere of life a R.A.F. cadet.

TRYING CONCLUSIONS WITH FIFTEEN-POUNDER.

A NOTE has reached us concerni Sapper F. E. Flint, who wa prior to the war, manager of t Motor Service Co., London. A litt while ago w heard that h was in hospit having been t close to a fiftee pounder shel He was foun wandering abo the country, a had been appa ently doing so f twelve hou with no memo or speech. W hope that he w soon be fit agai

Sapper F. E. Flint, R.E.

£100,000 FROM THE NIZAM C HYDERABAD.

IN response to Mr. Lloyd George appeal to India, the Nizam of Hyde abad has offered £100,000 to help the war

THE MOTOR CYCLE AVIATION SECTION

The enormous importance of the Air Service needs no emphasis; it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National Service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouragement of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

e Boy who Swung the Prop.

sixteen-year-old boy walked into the other day in quite a nonchalant ner, and stated that he had just ed up an aeroplane which had been d to land not far from his home. did not think it at all remarkable. ging a prop, however, is exceedingly erous work for anyone not accusd to aeroplanes, and this rather ng youngster is to be congratulated is nerve. The danger lies in back and the possible inability of the ator to get out of the way of the tly moving blade.

◆

The First Victims.

is not generally known that the first plane to be brought down by another t was that which the heroic Russian, t. Nesteroff, encountered on the 8th eptember, 1914. The attacker, having arms (it was not till later that men up rifles), deliberately headed his chine for the enemy craft; the two oplanes fell, locked, and both pilots e killed outright. Nesteroff was the t man to loop the loop; this he did April 27th, 1913—a few days before goud.

◆

"Tails Up."

t would be difficult to imagine, in scribing the temper of the R.A.F., a re felicitously apposite expression than ails up," apart from the fact that a tle jocular slang lends much colour to n. Salmond's famous message. "Tails " not only suggests the canine expression of happiness and self-confidence, but also connotes the attitude of the aeroane when she is "all out" behind a ll-tuned engine. A machine in which e motor is lagging and sluggish can ly dawdle along "tail down," and has surplus of power to expend on any anœuvres.

AIRMEN MOTOR CYCLISTS

IN pre-war days the late Lt. Graham Price was a well-known private owner competition rider of Bat motor cycles. He joined the R.E. as a despatch rider at the outbreak of war, and was in the retreat from Mons. In the early part of 1916 he was granted a commission in the R.F.C., and soon afterwards news came to hand of Price attacking at the same time three Fokker and two other enemy aeroplanes. The late lieutenant met his death during a fight in the air with an enemy aeroplane.

As showing Lt. Price's fine character, we have abstracted a few lines from a letter he sent to his mother, in which he said: "If I am killed, do not grieve for me, but feel proud that you have had a son to give in the country's cause."

The late Lieut. Graham Price, R.F.C., who, on one occasion, attacked five enemy aeroplanes at the same time. He was killed in an aerial fight.

A Glimpse of Air Fighting.

The following extract is a vivid page from the diary of Adj. Maxime Lenoir:

"In fighting, more than anything else, '*chi va piano, va lontano*' (he who goes slowly, goes farthest). I remember one day, on a job of protecting a reconnaisance, I ran full tilt into a cluster of Boches. We fought with the ultimate energy, but my machine gun jammed after a few shots. *Que faire?* I could not run; 'twould be to leave my comrades at the mercy of the enemy. I bluff; I simulate him who plays with his rivals. A sinister game! There am I, throwing every sort of *volte-face*, swooping like a madman to make them think I am trying to engage. Each time the same thing happened; the adversary, though superior in armament, skipped hurriedly. A real flight of sparrows, but sparrows more ugly than brave. A platonic success."

◆

Replacing Linen Fabric with Metal.

News comes from America that a prominent steel company is filling a large Government contract for sheet steel intended to replace linen fabric as a wing covering. After prolonged experimenting, it is stated that the metal can be rolled as thin as one-thousandth of an inch. When one thinks that a safety razor blade is about 12-1000in. thick, and the elusive cigarette paper exactly one-thousandth of an inch, this seems almost incredible. The difficulty of adequately tensioning the material, and its liability to rust, would also have to be reckoned with. Nevertheless, experimenting of this kind is to be welcomed, as nobody in the aviation business holds the opinion that the present rather flimsy wing and fuselage construction has come to stay. But wings of thin and resonant metal would surely make a sound like the cymbals of a circus band when the engine was running.

FLYING FACTS AND THEORIES.

CONTROL III. "The Immelmann" and Other Stunts.

By W. G. ASTON, A.F.Ae.S, A.M.I.A.E.

BY means of the loop combined with the roll many valuable stunts have been designed, and are daily performed in almost endless variety. Amongst these the "Immelmann," called after the famous Boche pilot, who, if he were not the first to cut this figure, was at least the first to introduce it in air fighting, stands out as a type of what can be done in the way of deceptive and quick turning. We will suppose that the machine is flying normally level as at A in fig. 1. The first operation is to roll the aeroplane through 90° until, looked at from the side, it is as at B. This rolling is now continued through another thirty or forty degrees, perhaps more in some cases, so that the machine is now heeled over and partially upside down. The next movement, C, takes the form of executing the second half of an ordinary loop. This brings the aeroplane right side up again, but facing the direction in which it originally started, as shown at D.

The speed throughout this manœuvre is pretty high, especially as the direction in which the controls are exercised is such that such energy as is lost by the extra resistance imposed during the roll and the looping recovery is, at least partly, regained from the partial dive which takes place. The controls are exercised as follow: For the first part, *i.e.*, the roll, the stick is brought right back and fully to one side (according to the direction in which the pilot desires to roll). The rudder bar is, at the same time, thrust well forward on the same side as the stick is lying, until the second part, the loop, is commenced, when the machine is straightened out according to circumstances.

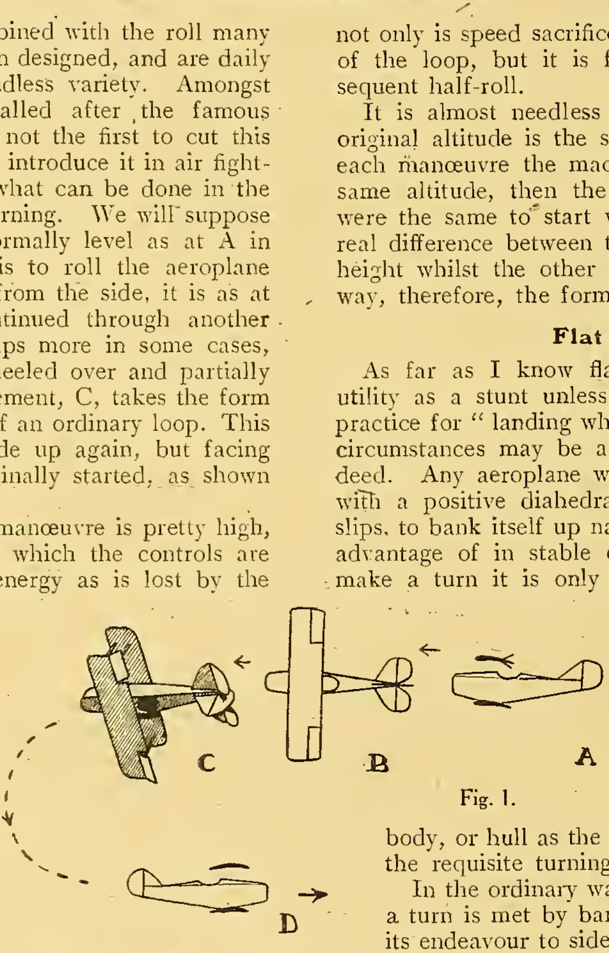


Fig. 1.

The manœuvre can be executed in the reverse direction. First of all, the upward half of a loop is carried out, which faces the machine in the opposite direction and puts it on its back. Next it is rolled over until right side up again. If performed in this manner this figure (I am ignorant of its particular nickname) tends to slow the machine considerably, inasmuch as not only is speed sacrificed heavily by the upward h of the loop, but it is further impaired by the su sequent half-roll.

It is almost needless to say, however, that if t original altitude is the same in both cases, and aft each manœuvre the machine is again brought to t same altitude, then the final speeds (assuming th were the same to start with) will be the same. Tl real difference between these figures is that one los height whilst the other gains it, and in the ordina way, therefore, the former is the faster.

Flat Turning.

As far as I know flat turning has no immedia utility as a stunt unless it be regarded as necessa practice for "landing whilst yawing," which in certai circumstances may be a very valuable manœuvre i deed. Any aeroplane which has its wings set flat with a positive diahedral angle tends, when it sid slips, to bank itself up naturally, and this fact is take advantage of in stable designs, for, in this case, t make a turn it is only necessary to use the rudde control. Now the firs effect of throwing over th rudder is not to make th machine turn, but to mak it side-slip, and the sam conditions exactly occur i a boat. It is this side-sli which promotes a resist ance on the side of th body, or hull as the case may be, and so furnishe the requisite turning couple.

In the ordinary way the tendency to side-slip o a turn is met by banking the machine over, unti its endeavour to side-slip inwards due to gravity i exactly equal to its tendency to side-slip outwards o account of centrifugal force. If no bank is put on or if the natural tendency of the aeroplane to bank itself is neutralised, or overcome, a flat turn will be made, during which it is side-slipping the whole time and so preventing the turn from being a sharp one. The rudder is used as for the ordinary turn, but th stick is thrown over in the wrong direction—that is t say, the aileron on the outer wing is set negative, *i.e.*, pointing upwards, and that on the inner wing positive, or pointing in a downward direction.

ying Facts and Theories.—

Since the manœuvre results in the air passing not raight across the planes, but diagonally, it follows iat efficiency is lost, and that the machine will tend) lose height. In order to maintain altitude and speed uring a flat turn, a considerable amount of reserve ower will have to be drawn from the engine.

Landing whilst "Yawing."

From the above it will readily be perceived that by ıfficiently operating the aps against the rudder the eroplane can be made to avel, whilst still on an ven keel, practically dead ideways, though in doing o it will inevitably lose eight very rapidly.

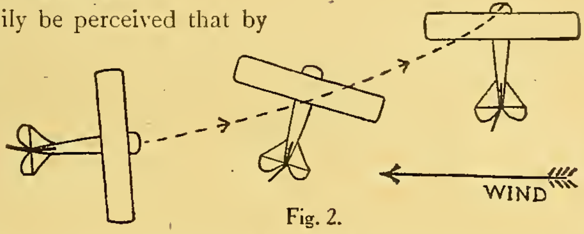


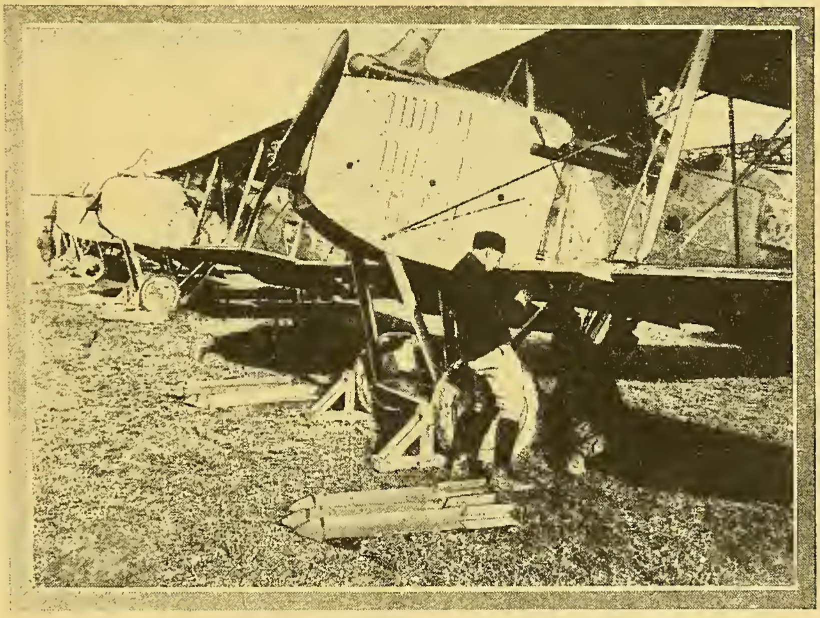
Fig. 2.

When an aeroplane is brought to ground it is obvious hat no side-to-side motion is desirable, otherwise the vheels, in resenting the skid demanded, will impose ıeavy strains on the landing gear, hence it is usual to and against the wind, or, in fact, anyhow but across t Supposing, however, that the conditions (engine ailure fairly close to the ground, for instance) are uch that the aeroplane *must* be landed across the vind, this ability to yaw (the word, is, to all intents and purposes, interchangeable with "side-slip") is very valuable, as it enables the pilot to drive his machine *into* the wind, whilst still pointing *across* it. To land, the pilot yaws his machine more and more into the wind, so reducing his yawing speed, relative to the earth, to nothing at all, whilst at the same time the forward speed of the machine is also greatly reduced. At the moment of touching ground, therefore, the aeroplane has no motion relative to the earth except a slight forward one, and landing conditions are thus perfectly complied with. The run of the machine after touching will also be very small. Fig. 2 shows the progressive stages of the manœuvre from above, the ground conditions being supposed to be such (as indeed they may easily be) that a landing either against or with the wind is out of the question.

It is almost unnecessary to add that for landings of this description the proportion of yaw applied is naturally dependent upon circumstances—that is to say, the motion of the aeroplane may be anything between dead into the wind and dead across it.

1910 IN AVIATION.

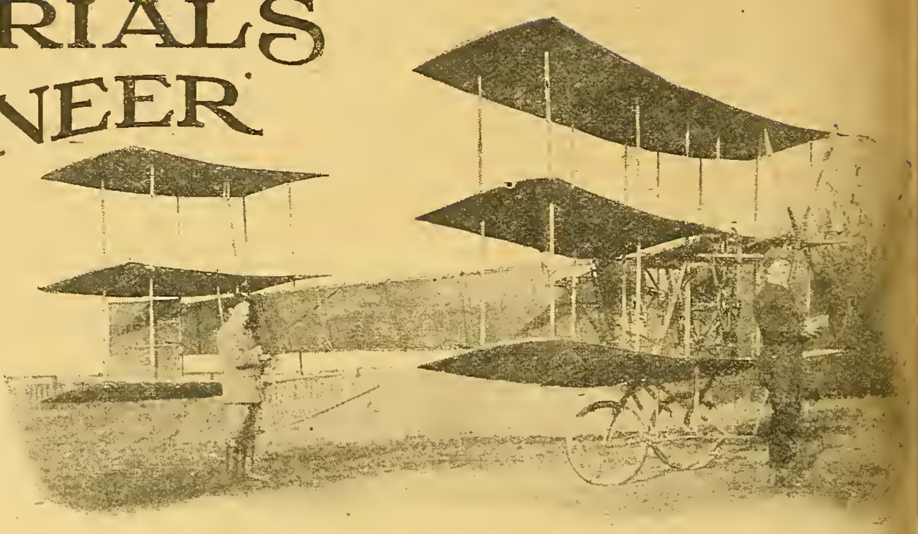
THE year 1910 was, perhaps, the most eventful in the evolution of the aeroplane. In April Paulhan flew from London to Manchester with ıne halt in 4h. ?m., and won :he *Daily Mail* £10.000 prize. In May Glen Curtiss flew from Albany to New York, 150 miles with two halts, in 2h. 54m. In June the Hon. C. S. Rolls flew from Dover to Calais and back without alighting. In July Mamet flew for 1h. 38m. 20s. with two passengers on a monoplane. In the same month L. F. Morane flew twenty kilometres at Rheims at an average speed of 66 m.p.h., and on the same day M. Olieslaegers completed 245 miles in 5h. 3m. 5s. In August, M. Chavez attained a height of 5,850 feet at Blackpool, and a few days later, at Douai, France, Bréguet carried five passengers on his biplane.



At a French aerodrome. Aviators preparing the adjustments of bombs under the wings of an aeroplane.

December was the busiest month, as between the 18th and 31st several record flights were made. At Buc, France, Henry Farman made a flight of 8h. 12m. 54s., and on the same day T. Sopwith flew from Eastchurch, Isle of Sheppey, to Beaumont in Belgium, 169 miles, and won the De Forest £4,000 prize. At Pau, France, Legagneux flew 320.6 miles in 5h. 59m. 59s. on a Blériot monoplane. At Los Angeles, U.S.A., Hoxsey attained a height of 10,400 feet. At Buc, France, Tabuteau flew 362.8 miles in 7h., and at Farnborough Colonel Cody flew for 4h. 47m., covering 189.3 miles, and won the British Empire Michelin prize. From the above it will be noted that to France, Great Britain, and U.S.A. alone is due the credit for the early development of the aeroplane. Germany achieved nothing.

THE TRIALS of a PIONEER



Flying with an 8 h.p.-engined Aeroplane.

BACK in 1907 Mr. A. V. Roe, a versatile English engineer, who had in turn tried his hand at motor, marine, and railway mechanics, became interested in the pioneer work of the Wright brothers. The cycle mechanics of Kittihawk were experimenting busily, and their example, together with the success of Otto Lilienthal, decided Roe to experiment with gliders. Later he constructed a model, driven by the usual twisted elastic strands, which won a prize offered by the *Daily Mail*.

By dint of great effort Roe managed to scrape together enough money to build an experimental biplane. Readers will remember the ridicule with which early aeronauts were covered, and not the least of the difficulties that the experimenter had to contend with was the rasping humour or utter indifference of the public. No record appears to have been kept of the performances of this first machine, but this much is ascertainable; if the machine ever did leave the ground it can have made little more than an extended hop, as there does not seem to be any record of it in the technical press of that time.

The next machine, which is the triplane illustrated, made history, for it actually got off the ground. Motor cyclists who do not happen to have heard of this craft will be interested to learn that it was equipped with a standard 8 h.p. air-cooled J.A.P. motor cycle engine. The machine itself was constructed of various odds and ends, portions of a superannuated pedal cycle playing a prominent part in its make-up. This was not the sort of power unit that one would have selected for so momentous an experiment, but, like most of the pioneers, young Roe was woefully handicapped by lack of cash, and, in the face of the scepticism referred to, it was practically impossible to secure capital for work of this kind.

Flying in the Face of Providence.

In the autumn of 1907 this little 'bus was run out on Lea Marshes, that desolate tract of land in the north of London, an abode of stray cats, tomato tins, and ash heaps. The machine indubitably flew, though its progress was erratic, to say the least of it. The authorities, enraged at this literal flying in the face of Providence, forbade further experiments here on the ground that the grass was being spoilt for grazing!

In the light of his vision, Roe persisted. Another experimental machine left the ground at Wembley Park. The pilot endeavoured to turn sharply, but fell, and the planes were rather badly damaged. This accident was ascribed to recent modifications in the steering arrangements which had been carried out. About this time the veteran Cody was meeting with some measure of well-deserved success, and in an attempt to win the thousand pounds prize offered for a flight from Liverpool to Manchester he succeeded in covering ten miles. An heroic feat in those days!

Roe's Wembley experiments came to an untimely end, as the owners of the enclosure where the flying was done insisted on the machine being lifted over the spiked railings each night and placed outside. Levitation of this kind proved even more disastrous than the regular flying, and the machine was put out of commission through rough handling.

In 1909 matters had progressed so far that a flying meeting was held at Blackpool, and Roe decided to put in his entry. The Frenchmen had secured a very considerable lead in the art by this time, and poor Roe's "grass-cutting" efforts were hailed with unholy glee by the crowd that had become *blasé* with the more showy flights of the competitors from abroad. They unkindly dubbed the Avro, which, like d'Artagnan's horse, was the colour of a buttercup, the "try-try-try-again plane." Nevertheless, in it were the elements of the very successful fighting machines which this concern has turned out since.

A Non-standard Aeroplane.

A year later another meeting was staged at Blackpool, but the train which carried Roe's two machines was wrecked, and nothing was left of them but a mass of burnt scrap! The plucky pilot telephoned his little works at Manchester to extemporise a machine out of anything that was handy. Scraps of mummified aeroplane were hurriedly sorted out, and in three days the machine was ready. Two more days elapsed in anxious waiting until the Green vertical engine which had been wired for arrived; and on the same day that it came to hand Roe flew, accomplishing two and a half circuits of the course. He had to come down because the machine was practically uncontrollable.

In 1911 Roe reverted to the biplane form again, and in 1912 he constructed a totally enclosed type of machine, engined with a 60 h.p. Green. The 1913 machines were powered with an 80 h.p. Gnôme, and since that date Roe has more than held his own in the British aviation world.

R.H.B.

THE MAXIMUM PENALTY.

How a Thoughtless Act might have ended in Years of Imprisonment.

THE leave boat landed me at —— on the day on which motoring for pleasure was forbidden; but ten days' leave to England render ne a little reckless, and it took me some two seconds decide that I would ride my old Triumph and chance it.''

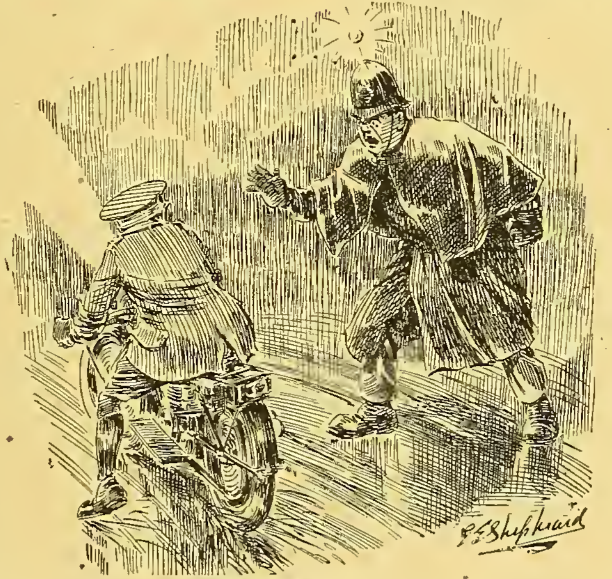
Petrol, that mystic and forbidden liquid, had lain idden in my shed for two long years—petrol, not of iat paraffinish, Government variety, but of the good ld No. 1 Shell brand. The bicycle I discovered be a dust-covered patchy affair of rust and aseline. The jet had choked itself in the velve months that had elapsed since my last eave, and the rocker arm of the magneto was tuck permanently open. But the engine would go ound, and the tyres were in fair condition. A few ninutes' attention to the magneto and carburetter, little Pears soap on an old leak in the tank, a allon of petrol, a pint of oil—and the machine was eady for the road.

My first run finished at a garage in Birmingham, vhere I left the old bicycle intil the end of the evenng. Emerging from a second-house music hall, I sought in vain for a restaurant where I could get some coffee: but cold and defeated, I decided to go nome on a tram rather than skid through the November fog on a smooth-tyred, single-geared motor bicycle. So I reached the tram terminus ten seconds after the last tram had left it.

Taxis seemed non-existent, and had they been in evidence their drivers would probably have refused to take me the distance. A five-mile walk seemed almost more disagreeable than a five-mile "mud-plug," so I went off to the garage and devoted half-an-hour to my ancient lamp. This finally responded to efforts by bursting into a flame which blew out the glass and cracked the reflector; but by this time I was too disgusted to worry, so I shoved the machine from the garage and ploughed off through the filmy darkness.

For a mile or so my journey was without incident, if one excepts a few skids in avoiding late theatregoers and others with a desire for suicide. The engine chugged along well, and the lamp, pointing, like Agnes Wickfield, sweetly skywards, gave a fair imitation of a "miniature mobile searchlight." This glare on the fog cut off my vision, and made steering rather difficult, but by leaning well over to the right and tilting my head a bit further I managed to get a restricted view.

Presently I noticed a red glimmer some twenty yards away to the right, and as I drew nearer I saw that it was a small red lamp. Suddenly it began to bob up and down, and a second later came leaping across the road towards me. Fog, we are told, may penetrate the brain; in this case, at any rate, I had a fleeting vision of a crash as I swerved violently away from the little red light. It was not until I was recovering (with much foot assistance) from my skids that I remembered the Birmingham custom. For, since the darkness of the streets, the learned councillors of Birmingham have supplied the police force with little red electric lamps, set like an apple on a hat-pin above the helmets of the traffic controllers.



"Now then! Watcher ——"

"Now then! Watcher ——" was all that I heard from the sound-box under the lamp before the Triumph had borne me out of earshot; and, being once passed and lost in a world of fog, I felt little disposed to go back and see if he wanted to borrow a match. Policemen at all times are no men to consort with, and a single-geared $3\frac{1}{2}$ h.p. is not pleasant to start on a slippery gradient.

Ten minutes after the incident I had pushed the machine into its garage, where I noticed that the tail lamp had gone out.

Next day I looked over the machine and thought carelessly of the night before. I remembered the little red lamp—and the incident made me smile. Then I thought again, and saw in it a more serious light. Supposing the "arm of the law" had shouted me to stop? Supposing, after all, he had not wanted to borrow a match to light his—er—slide lantern? What if he had imagined I was driving to the danger of the public? Policemen's imaginations were, as I knew

The Maximum Penalty.—

to my cost, of a most remarkable and elastic nature. *If* he had ordered me to stop—and in my pessimistic mood I would not give myself the benefit of the doubt —I had committed a "crime." I laughed and told myself I should be back in France. I felt the front brake, thought of the extinguished tail lamp, remembered the petrol licence—and fled into the house for a sheet of paper.

The First Step in a Career of Crime.

Hurriedly I enumerated my crimes and shivered to myself as I thought of them. I had started, twenty-four hours before, on a harmless motor cycle run of some twenty miles in length. I had finished it and had slept, as I thought, the sleep of a just and weary man. Now in the cold, clear daylight I realised my "frightfulness."

Here is the list of my misdeeds:

(1.) Driving to the danger of the public.

(2.) Disregarding the policeman's signals.

(3.) Carrying a head lamp which could be swivelled up and down.

(4.) Riding with number plates not illuminated. (Head lamp pointed at sky.)

(5.) Riding with number plates which, even if illuminated, were quite illegible.

(6.) Riding with number plates which, even if illuminated and legible, were fictitious.

(7.) Carrying too powerful a head light.

(8.) Carrying no rear light.

(9.) Driving a motor cycle fitted with a silencer cut-out.

(10.) Driving a motor cycle without an instrument (except the engine!) capable of giving "audible warning of approach."

(11.) Driving without any sort of licence to obtain petrol.

(12.) Driving for "pleasure" after prohibiting law.

(13.) Not being in possession of an Inland Revenue licence.

(14.) Carrying no licence to drive any sort of motor vehicle at all! (Old licence had expired two years ago!) And

(15.) Driving a motor cycle not fitted with two independent brakes.

Having enumerated the offences I placed them in two classes:

Class A.—Offences under the Motor Car Act. Nos. 1, 2, 4, 5, 6, 8, 9, 10, 13, 14, and 15.

Class B.—Offences under the Defence of the Realm Act. Nos. 3, 7, 11, and 12.

A Fugitive from Justice.

I now observed myself to be a criminal of the most hardened and pronounced type. Even a hurried return to the zone of hostilities could scarcely save me from fifteen different offences committed at the same moment—four of which offences came under that most stringent of all Acts, the Defence of the Realm. The Passchendaele Ridge was no health resort, but its dangers seemed slight to those of the police court and the dock. But there was one saving point: *I had not been caught.*

I returned to the shed, locked the doors, and threw away the key.

Then I felt that I was fairly safe, but I was interested in the matter, so I settled once more to my slip of paper and worked out, very roughly, the maximum penalty. (Natural modesty—and a sneaking fear—prevented me from going to the local police and discovering from them the accurate greatest fines or terms of imprisonment which could be imposed by a stern judge or magistrate.)

"Driving to the danger of the public" might be rewarded by a £50 fine or several months' imprisonment. Disregarding the policeman's signals might be taken as a terrible offence, and met by a similar punishment. The number plate offences were not so serious—except the last, which I had read in the papers once cost a cycle repairer twenty pounds. Nos. 8 and 10 were comparatively slight affairs, but in respect of a silencer cut-out I had already suffered twice. Nos. 13, 14, and 15 might between them run to about £100 fine or a year's imprisonment.

Safe at Last!

Then I turned to Class B, and as I thought of the possibilities in that direction "the sweat poured down my brow" (as the novelists would say). Carrying too powerful a head light—and a swivel one at that—was an offence which could only be connected with German spies and aeroplanes, and the penalty might be "death or some such lesser punishment as is hereinafter mentioned."

Here I fainted (almost).

The last two offences, for which I might reasonably have been prosecuted, could scarcely have cost me more than £100 or a year's prison, and they therefore seemed trivial to those which I had already committed.

The total amounted to some few thousand pounds in fines, about thirty years' hard labour, or, in atonement for all, death!

* * * * * *

A few days later I was back in London with my ten days' leave near its end. The horror of the police had gradually left me, and as I walked about Piccadilly I was filled with a vast contempt for their trivial authority. Smoking a cigarette, I crossed the street boldly and swung my cane perilously near an immovable limb of the force.

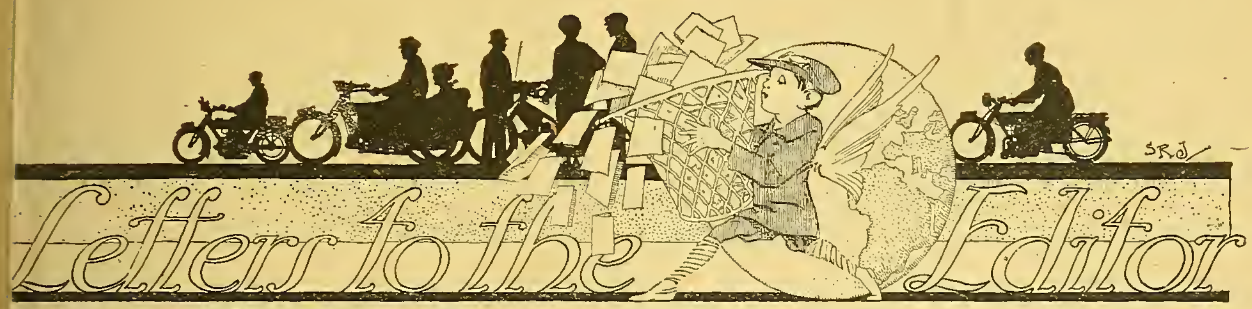
Then I ran into an A.P.M., who wanted to know (1) why my shirt and collar were nearly white, (2) why I was wearing shoes instead of boots, and (3) my name, address, and unit?

Truly are the police like the poor, for in some form or other they are ever with us!

But, thank heaven, I am now back in the Line, and can write this and think over my misdeeds in safety and peace. G.D.

OVERHEATED GUDGEON PINS.

SOME months ago we published an article dealing with the crown of the piston as the hottest spot in the average engine, and it is common knowledge that special designs of aluminium piston have been framed to conduct heat away from this very warm spot. Now the talk is of overheated gudgeon pins. The new radiation systems have proved so successful that the piston crown has degenerated into a refrigerator, but the conducted heat has dried up all the oil in the gudgeon pin bush, which promptly shows its resentment by seizing.



The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address

EAVY WORK FOR A TWO-STROKE.

Sir,—There must be many owners like myself of the 2¼ h.p. o-stroke Enfield who would like a little more information the feasibility of adding a small sidecar to the machine. There appears to be power enough, and a sidecar would aterially increase the usefulness of the machine as a run-out and carrier, and in my case would, in all probability, but rarely used to carry a passenger.

I was not aware that there was a sidecar with 24in. wheels the market.

Hoping to hear the experiences of riders and readers,

Birchington-on-Sea. BUNGALONIAN.

ACKRESTS FOR MOTOR CYCLISTS.

Sir,—I had occasion lately to undertake a ride of 200 miles, d, being doubtful about supplies, took a tin of petrol on e carrier. I placed a cushion of straw between the saddle d the tin, and was astonished to find the comfort it gave. usually feel backache for a few days after a long run, but this occasion it was entirely absent. In future I intend tie a tin, empty or full, on the carrier for the sake of mfort on long runs, though perhaps it does not look beau-ful. The problem presents itself: Would it not be possible devise a spring back on the saddle or on the carrier?

Milford, Donegal. CUSHION.

[There are several backrests already on the market.—Ed.]

YDROGEN FROM WATER.

Sir,—The subject of petrol substitution is at the present ime a very important question, and therefore a very interesting one.

It has occurred to me that if water could be decomposed n a sufficient quantity and speed to supply the engine with ydrogen a very good substitute might be thus obtained.

The decomposition of water by means of electrolysis first resents itself to the mind, but this method would be too low on account of the limited amount of current that could e generated on a cycle. Could not the hydrogen be liberated y some chemical means? Perhaps some of your readers who are chemists will give this matter some attention, if it is worth it. AN INTERESTED READER.

Newcastle-on-Tyne.

CONCRETE ROADS.

Sir,—*Re* your article on concrete roads, in the issue of 9th May, I should like to ask, "Why concrete?" The majority of London roads (those that are not wood blocked) are of Val de Travers asphalt, which seems to me to make a very smooth and lasting surface. I should like to see figures comparing these two methods—from the points of view of expense and life.

To put forward a suggestion. Would it not be possible to roll sheets of steel to the required camber, and lay them on a secure foundation?

If this could be done, I think that half the accidents arising from pure inability to pull up in the distance given (wheels skidding and so on) would be obviated, because vehicles could have a magnetic brake, which, of course, is the most powerful form of brake known.

This may probably cause you to smile, but I think that you can but agree that the idea is reasonable, and that it would lessen the number of accidents. It seems to me that the construction of the steel plates should be an easy matter.

L. W. E. HARTLEY.

GAS TRACTION.

Sir,—In your leading article in *The Motor Cycle* of May 2nd, you discuss the Gas Traction Committee's interim report, wherein the Committee gives its unanimous opinion that the substitution of coal gas in place of petrol for the propulsion of motor cars can be effectively, safely, economically, and promptly carried out.

You, however, have taken very little notice of that part of the report dealing solely with gas bags, wherein the Committee states that "the working life of a gas bag made in accordance with its specification may be considered to be, normally, about eight months; while gas bags made of inferior fabrics may leak after being in use only one month, to the extent of losing as much gas as they use."

This seems to me to condemn absolutely the gas bag as a commercial proposition, as, even when employing the best possible fabric for making the bag, the capital outlay has to be repeated at the end of eight months; while the waste of gas when using a cheaper bag is already 100% of the amount consumed in the engine before it has been in use five weeks. Such a waste of gas is unpardonable in war time, and it is quite probable that this is the reason for the sudden cessation of the issue of fresh gas permits.

I understood that this interim report was originally intended only to review the employment of gas in flexible containers, but no doubt, owing to the waste of gas reported as above, the Committee has already investigated the question of compressed gas, and its report in that respect is most satisfactory, for the Committee says in paragraph (17) Metal Cylinders, "It is desirable to encourage forthwith a limited number of experiments on a commercial scale with compressed gas in rigid metal cylinders at pressures of 1,800 lb per square inch (120 atmospheres)."

The 3 ton Wolseley lorry fitted up on the Flugel compressed system for the M.T. War Dept. was fully tested by the Senior Inspector of Army Transport and inspected at work by the Gas Traction Committee, and gave entire satisfaction; but it is evidently now desired that this high-compressed system should be taken up *on a commercial scale*, so that its marked superiority to the flexible container can be fully demonstrated.

I understand that (if necessary) a special licence will be granted for this purpose by the Board of Trade, but that gas permits already granted to users of gas in flexible containers can be used for this purpose. I shall therefore be glad to get in touch with any firm who is considering the question of using compressed gas for essential transport purposes. The cost of driving on gas is only about one-third of the cost of driving on petrol, so it is quite certain that after the war commercial firms will all use gas. One large municipal authority whose petrol motors have been converted to the compressed gas system tells me that it saves 25s. per day per vehicle by substituting gas for petrol—no small advantage.

Having felt certain for a long time that the only solution of the fuel shortage problem is the use of compressed coal gas at medium or high pressures, I, in my capacity as director of Messrs. Flugel and Co., Ltd., have made preparations in good time, so that at the moment we hold in stock for immediate delivery all the necessary material, including compressors, steel bottles, reducing valves, gas carburetters, high-pressure tubing, pressure gauges, and everything else necessary to make a start forthwith upon a commercial scale.

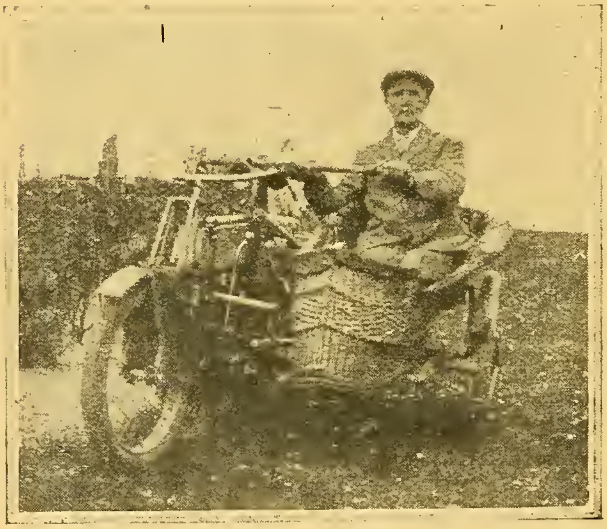
B. FLUGEL.

PETROL FOR MUNITION WORKERS.

Sir,—I, for some time, applied for petrol to go to and from a plantation, involving a distance of ten odd miles per diem. At last, in despair, I gave up, and found I could manage quite well with the pedal cycle. I have no grudge against the munition worker and his petrol, but surely a man can manage to cycle two or three miles, even if he has been standing on his feet for twelve hours. I consider digging all day just as tiring to the feet as standing. Much as I like the push bicycle, the motor bicycle is, obviously, better still; but the former involves no great strain to propel, and provides exercise as well. C. McCLELLAND.

MOTOR CYCLING FOR THE MAIMED.

Sir,—I am sending you a photograph which, I think, will be of interest to any of your readers who are maimed. For the last few years I have only been able to walk with difficulty for a few yards, and in your issue dated March 13th, 1913, you reproduced a photograph of me being driven by my wife. Since the war my wife has driven a motor 'bus for three years, and is now serving in France in the W.A.A.C.'s as a motor driver. I was compelled either to alter my machine and drive from the sidecar or else give up the pastime, which I had found of great benefit to my health as an invalid. The photographs show the result of my attempt, and will also prove me to be more of a sailor than a mechanic. Anyhow, the thing is a great success. My first long ride driving myself was from Deal to Southend, crossing the Thames by the Tilbury Ferry, and all went well both out and home. The machine is an old Chater-Lea-Jap, and has been running almost daily since 1912 without attention except from myself. The design of the whole outfit lends itself to very easy control from the sidecar. The two-speed gear, which combines a clutch, is close to my right hand, all the controls and the brake are at hand, and I start the engine by a handle attached directly to the engine-shaft. I have been riding the machine for some years now, and feel quite at home on the road.



An old Chater-Lea outfit converted to control from the sidecar.

F. R. BALCHIN, Lt. R.N.R. (retired).

THE SPRAG BRAKE.

Sir,—Judging by the issues for the last few months of your world-famous journal, this is a time of improvements both in the design and fitments of motor cycles.

I write to endorse a serious "want" in the sidecar class. I speak from personal experience, having owned several heavy outfits. The brake levers on a sidecar should be capable of being locked on as on a car.

How ridiculous it seems to have to back your outfit into a gutter when stopping on a hill. When there is no gutter one looks around for a brick—if there is a brick, how are you to get it, if it is out of reach? Sometimes it is an embankment against which you back the machine. I found the mudguards too weak for this purpose. Sometimes a kind friend left his car on a hill properly braked to come to my assistance while I got away on low gear.

I am aware you prefer constructive criticism to the destructive species, therefore I submit one or two ideas, that may be of value to manufacturers and others as a means of surmounting seemingly impossible obstacles. Material required: A brick and some cord. One end of the cord is tied to the saddle, the other end to the brick, the cord passing from the saddle over the back stand. Thus, the brick can be lowered by undoing the cord at the saddle, when the brick will reach the road just behind the back wheel, the only disadvantage of this "ingeniosity" being that it is only available when the stop is made facing up a hill.

However, the following may be a better idea (although improvement seems doubtful).

By name, "Sprag-brake," consisting of a centrally pivoted footboard, having a steel spike at each end, which can be let down either way into the road most effectively.

A simpler way than either of those stated is that "She" can have ready in the sidecar with her an ordinary domestic broom. She will soon learn under which wheel it is necessary for her to put the head (the broom's head).

TOP-HEAVY.

A BAFFLING EXPERIENCE.

Sir,—Referring to the letter from Mr. F. W. Chapman in your issue of April 18th, may I take up a little of your space in order to air my views?

1. *Plug.*—No plug is immune from breakdown, but I have never yet in my motor cycling experience handled a plug which, after giving up the ghost, cured itself without external assistance. Mr. F. W. Chapman's second plug, after reposing all night in his pocket, among the dirt and *débris* that a motor cyclist's pockets usually contain, consented to deliver a spark in the morning at the first depression of the kick starter, after refusing to do so at midnight the previous night while *in situ* in the cylinder. I therefore submit that the *plug* was not at fault.

2. *Magneto.*—Magnetos have their little aberrations, and chief of these, methinks, is a sticking rocker arm on the contact breaker. Since Mr. F. W. Chapman failed every time to obtain a spark with the plug in the cylinder, and succeeded every time when the plug was placed outside, I think that the succession of coincidences required to make his failures and successes agree with the stickings and normal workings of the rocker arm is far too remotely improbable to be given serious consideration.

Moisture in the magneto spells one of two things—either total temporary breakdown of the ignition system, or so weak a spark at the plug that its puerility may be observed, particularly at night time, when the plug is placed on the cylinder and tested in the usual manner. Since Mr. Chapman obtained a healthy shock every time he held the high-tension terminal, we may therefore exonerate the magneto from all blame.

We are thus driven to conclude that a short circuit exists between the magneto and the plug, appearing only when the plug is in position in the cylinder. My solution of the mystery is based upon the assumption that Mr. Chapman has, tied or strapped round his tank, either knee-grips or bags of some description, the underside being in close proximity to the central electrode of the plug when the latter is in position. In normal circumstances, leather is a fair insulator, but at night time, owing to dew deposit, it gradually becomes a good conductor, and may easily become the source of baffling short circuits of this nature.

Many years ago, in the Golden Age, I had a similar experience when riding an old single-cylinder Fafnir with coil ignition. I used to carry the coil on the top of the tank, secured in position with leather straps. Late one night, when miles from anywhere, the engine gave up the ghost, and it was only after much trouble that I discovered a short from the coil to the tank *viâ* one of the straps, moist with dew.

I should be pleased to know whether Mr. Chapman has a hooded terminal to his Lodge plug, or whether he is employing the ordinary metallic terminal. I should also like to know whether my assumption as to the existence of straps, etc., round his tank is correct or not.

I conclude with every wish for the continued success of your splendid journal. F. G. PEASNELL, D.R.
B.E.F.

CURIOUS CASE.

Sir,—The case of a $2\frac{3}{4}$ h.p. flat twin starting readily from d and firing evenly and regularly, with the rear brush-lder on the magneto (Thomson-Bennett) in position, but void of carbon brush, seems to merit notice.

This occurred recently with a borrowed machine. The ush had been deliberately removed—a curious precaution ich missed its object—and I verified this, to my surprise d that of the canny one, on returning.

Could you give this the benefit of your publicity? I am t guessing, as the end of the high-tension wire could not ve closely approached the collector ring.

Flanders. HAROLD C. COUSINS, R.M.A.

POST-WAR IDEAL.

Sir,—I agree with "S.C.C." in every respect as to the tual type of engine, but think a series of powers from out 900 c.c. to 400 c.c. in range would be advisable, a vo-speed gear box, with fairly close gear ratios, and nstant mesh.

I myself favour the elliptic springing and cantilever forks, ntrol by twist grip, but not by wires inside the handle-ars. I nearly got "bent" by one of this type rusting up. mple adjustment should be allowed both for gear box and ack wheel to keep the chains as requisite.

Also I think that solo, as a method of getting about, is referable to sidecar, and has the advantage that the frame an be made much lighter. C.G L S.

R.N.

ONG V. MEDIUM STROKE ENGINES.

Sir,—I was much interested in the article by "Mohandis" n the above subject. I think it ought to dispose of the idely held fallacy that because an engine has a long stroke, *pso facto* a more powerful turning effort is exerted on the ywheels. "Mohandis" shows that the total thrust on the iston of his short stroke engine is one and a half times the hrust exerted in his long stroke engine.

But the thrust in the long stroke engine is applied at a oint (the big end) which is one and a half-times the distance rom the centre of the flywheels as compared with the short troke engine. Consequently the total turning effort exerted n the flywheels is the same in each instance. I have only ouched on the question of mechanical advantage or leverage quite apart from the respective frictional losses, etc), as his is the point on which I have had many an argument n the past.

I greatly sympathise with the R.A.F. motor cyclists, as I myself served for nearly three years in the old R F.C., mostly in France with artillery squadrons. I always found that we motor cyclists were never appreciated by the R.F C. like the D.R.'s in the Signals were by their corps—in fact, one of the C.O.'s under whom I served told me that "any fool could ride a motor bike." I wish I had had a chance of taking him in my sidecar round the batteries on my visits to the wireless stations (especially during the winter!)

However, after much perseverance and waiting (fourteen months to be exact) I managed to get my application through for a commission in the R.G.A., so six months ago I bade goodbye to unpleasant fatigues, guards, etc., and entered a fresh and very interesting field of work.

I expect I shall be going out again in a few weeks, but I shall never under-estimate the abilities and troubles of the R.A.F. motor cyclists whom I encounter.

I have been a keen motor cyclist for nine years, and I have read your excellent paper regularly for longer than that. May it ever flourish! CLINOMETER.

Sir,—Your contributor "Mohandis" in his article "Long *v.* Medium Stroke Engines" concludes by saying, "The secret of the popularity of the *short* stroke engine must be sought in a region inaccessible to the mathematician."

May I be allowed to express my opinion on this subject? The popularity of the short stroke engine is due to the facts that it is lighter per unit of horse-power and more compact than the long stroke engine of equal capacity. If the mathematician likes to dissect matters he will find that, theoretically, the short or medium stroke engine holds its own and to spare.

"Mohandis" compares two engines of equal capacity—one with a bore and stroke of 85 × 88, the other 69 × 132—and arrives at the conclusion that the bearing pressures due to inertia or centrifugal force are practically identical in both cases, and I would here add that both these engines, being of the same capacity, must theoretically run at the same r.p.m. in order to give the same h.h.p. Therefore, the torque is the same, and, this being so, the average load on journal or crankshaft bearings must be the same, so that we may cancel the question of bearing loads and consequent wear of bearings from the argument.

"Mohandis" proceeds to show that in the matter of "mechanical efficiency" the short or medium stroke engine scores. He then goes on to say that the long stroke engine has 11% more cooling surfaces than the *short* stroke engine.

Now "Mohandis" will perhaps correct me if I am wrong, but my impression for some time has been that the engine with the least area per unit of volume in contact with the burning gases will have the highest thermal efficiency. Therefore, it appears to me that the short, or medium, stroke engine is popular, and quite rightly so, for the following reasons:

(1.) Higher mechanical and thermal efficiencies.
(2.) It can be made to weigh less per unit of power.
(3.) Is more compact.

All of which can be deduced from the article referred to, and yet the writer thereof appears to think that the fashion in short or medium stroke motors is based on individual prejudices and opinions. J. T. CLARKE.

LEAKAGE OF MAGNETISM.

Sir,—I would like to let my fellow readers of your journal know of a rather peculiar experience I have just encountered on the road, and I trust you will excuse me if I treat of it at some length, as I believe it will be of real value to some other poor sufferer.

I am one of the few fortunates who are still permitted to ride, and am up on a $4\frac{1}{4}$ h.p. 1916 B.S.A. countershaft combination with Dixie magneto, my former mount being a 1913 $3\frac{1}{2}$ h.p. solo B.S.A., Bosch magneto, and I am a hard rider to boot. When my $4\frac{1}{4}$ h.p. was about eighteen months old, it began to get "woolly," lost power, and continually missed fire whenever a bit of hill was met. I tried all the plugs on the market, and, being an engineer by trade, I tried everything I knew about motor engines on the machine. Finally, one day after a run of about thirty miles in wet weather, I stopped in a shelter to take some Bovril, and that was the finish. No more did that cycle go, despite everything I tried. I pushed it four miles to a garage, and immediately I told the garage proprietor my trouble and informed him that it was a Dixie magneto, he asked how it was driven. On telling him that it was a steel sprocket wheel and chain, he told me point blank that it would never go, as the magnetism was being drained through the steel wheel, as the Dixie is made the reverse way from any other. He had had to convert seven other machines for the same defect.

He was good enough to offer me the use of a Bosch off another machine, and to get mine done up and a brass wheel made instead of the steel wheel. The first kick made it roar with the Bosch, and, whereas my consumption had dwindled down to forty-five miles per gallon with the Dixie, I got then about eighty miles with the Bosch.

I have had a brass wheel put on the Dixie, and the magneto is improving, and seemingly getting stronger, but there is not nearly the same flexibility about the running of the engine as with the Bosch magneto. The peculiar thing was that when I took out the plug and tested it on the cylinder I got a spark, though not a fat one, but immediately I tried it in the cylinder the compression seemed too strong for the spark to jump.

This experience has cost me a few pounds, and I would advise anyone who fancies that his engine, driven by a Dixie magneto, is going "woolly," to look to the drive, if it be steel or brass, as the brass wheel stops the leakage of the magnetism through the Dixie shaft. Perhaps the Dixie or B S.A. people may have something to say in reply to this.

Kirkcaldy. W.A.

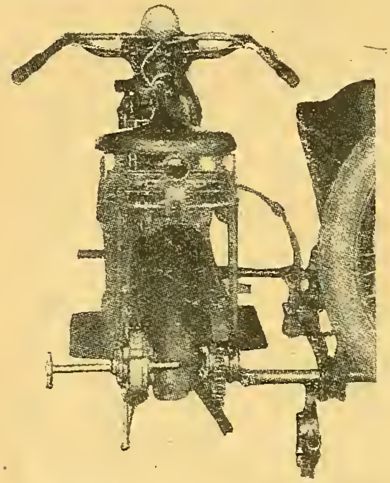
SUMMARY OF CORRESPONDENCE.

A Birmingham reader who works on munitions and has lost a son in the war suggests that *bonâ-fide* night workers who worked through the Easter holiday should be allowed to use their motor cycles at Whitsuntide to obtain a little fresh air and change of scene, and that a licence should be granted to them for that purpose at a cost of 2s. 6d. or 5s. on production of a note from the firm for which they work.

INTERCHANGEABLE WHEELS FOR "LIBERTY" MOTOR CYCLES.

INTERCHANGEABLE wheels form part of the specification of America's standardised military motor cycle used for sidecar work, a spare wheel being carried in the sidecar.

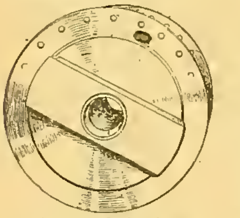
The chief problem in connection with the design of such a demountable wheel is, of course, to provide means for the transmission and braking mechanism in the rear wheel. All the wheels have annular ball bearings, which denotes a new departure in motor cycle construction in America.



The rear of the American "Liberty" motor cycle, with wheel detached. The brake, sprocket, and chain remain in place. Note central bolt partly removed.

There are essentially three parts to the rear wheel construction, *i.e.*, the central part which forms the hub, the left-hand part which carries the driving mechanism and is supported in the left-hand chain stay, and the right-hand part, which carries the brake drum, and is supported in the right-hand back stay.

The central part consists of an outer hub shell mounted on two annular bearings in a sleeve. The hub shell has an inward flange at one end, and a ring nut is screwed into it at the other end. The flange and the ring nut have grooves for felt packing, so as to keep dust out of the ball bearings and retain the lubricant. The ball bearing at the right-hand end of the hub shell has both the inner and the outer race clamped tightly, and therefore will take thrust loads, whereas the outer race of the left-hand bearing is free in the shell.



Showing hub of interchangeable wheel, with spindle removed.

Each of the side members of the hub construction also consists of an outer shell and an inner sleeve. In the case of the left-hand part the shell is supported on the sleeve by two adjacent ball bearings, while the right-hand part has one ball bearing only.

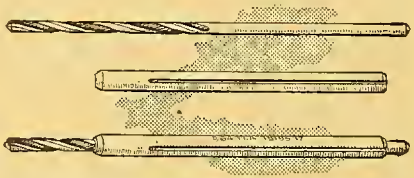
The driving connection between the central member of the hub construction and the two outer members is secured by the former having a dog or key transversely across its face at each end, and each of the outer members is provided with a corresponding groove.

The whole assembly is held together by means of a central bolt. When this bolt is removed the wheel can be drawn laterally from the two end parts.

The rear guard of the machine is hinged. It is claimed that a wheel may be changed in less than a minute.

A DRILL PROTECTOR.

ANYONE who has used drills of small diameter knows how easily these bend and break, especially when they are of more than average length. He will therefore welcome the little device put on the market by the Central Drill Protector Co., Holborn, E.C.1. This consists of a brass tube, which fits very closely to the drill near its tip, and has a slot cut from the bottom for about two-thirds of its length, thus allowing it to be compressed in the drill chuck sufficiently to grip the drill firmly. The protectors are made in various small sizes up to $\frac{1}{8}$in., and users of hand drills should find them a great economy.



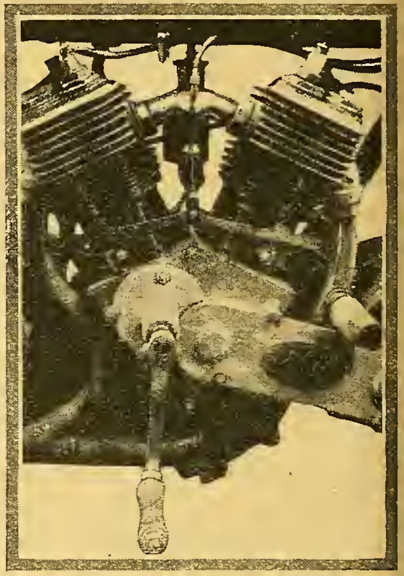
Showing how the drill protector fits over the drill.

A HANDLE STARTER FOR ZENITH MOTOR CYCLES.

THE accompanying photograph and description show how the difficulty of starting the big engine of a Zenith variably geared machine was overcome. To owners of Zenith models that lack a clutch and countershaft, this idea will make special appeal. The device is patented by Mr. H. Broadway, of High Wycombe, who describes the arrangement as follows:

The starter is operated in a similar manner to the starting handle of a car, and the engagement is secured by the following means. The existing cam wheel is used, having an extended shaft of a diameter of not less than $\frac{5}{8}$in.

The length of the shaft would need to be approximately $1\frac{1}{2}$in. long. The shaft is drilled and a $\frac{3}{16}$in. pin is inserted, which provides the medium of engagement of the starting handle. A suitable bush is fitted in the timing case, in which the shaft would run, and a quick release spring is fitted for throwing the dog clutch of the handle out of engagement. The whole is covered by a neat aluminium casing, which prevents the ingress of dirt. The casing is about 4in. in width at the flange, and tapers to a diameter of $1\frac{1}{2}$in. at the portion where the handle enters the cover. The entire projection from the timing case is approximately 4in. The handle is constructed to fold back neatly out of the way.



A patented device for the starting of old pattern Zeniths by means of a handle fixed to an extension of the camshaft.

This device could be adapted to suit almost any type of machine, and the expense of production would be quite small. The method of operation is such that a sure and easy start is obtained with a minimum of exertion. It is hoped to put this device on the market.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

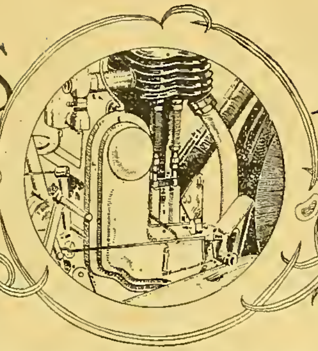
The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

CHEAP AND USEFUL.

NOW that we all do our own repairs, there may be some who will be interested to hear that a trip to one of those vermillion 3d. and 6d. stores on the American plan (which sell everything from dream books to rubber heels) might pay them. For a derisory sum one can obtain a hammer, centre and cotter-pin punches, files (flat, half-round, and triangular, medium and smooth-cut), cheap brushes, most useful springs, any number of bolts, hinges, and what-not, black weatherproof hats as effective as a sou'wester for the passenger, and quite good enough for occasional use, and, *mirabile dictu*, a perfectly practicable hacksaw—this last 6d., and really excellent.

QUESTIONS AND REPLIES



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Petrol for Use when on Leave.

Please inform me if there is any possibility of obtaining a petrol permit when on leave, and, if so, how much petrol is obtainable?—B.W.H., Lt. A.S.C. (B.E.F., France).

You should apply to the Petrol Control Department, 19, Berkeley Street, London, W.1, if possible at least a fortnight before you obtain leave. You will then in all probability get an allowance of two gallons for a motor bicycle and a permit to use it when on leave. If you cannot write well in advance of your leave, it is desirable to apply personally when coming home on leave.

Joining the Army as a D.R. Sale of Motor Cycles to the Government.

Please inform me if there are any vacancies for despatch riders in the Royal Engineers or in the Motor Transport, A.S.C. What qualifications are wanted to join either? Are the Government authorities buying motor cycles from private owners?—L.W.

Your proper course will be to apply to the nearest recruiting officer, who will give you the requisite information and state the qualifications. The Government are not buying motor cycles from private owners at the present time. This was only an emergency measure at the beginning of the war.

Aids to Cooling.

Will you please help me with a few queries concerning a 1914 a.c. 8 h.p. Morgan-Jap with *non*-adjustable tappets? (1.) Should I obtain any advantage by fitting Harcourt radiators (I go long fast runs)? Could I get them to fit my engine? (2.) About the tappets. I have been accustomed to the adjustable type, and the non-adjustable tappets on this J.A.P. engine rather worry me. I do not mind the noise much, as I have a fairly open exhaust, but I want to be sure the "lift" is not late. (3.) I have had a new B. and B. pilot jet carburetter, and find the makers' instructions as to setting rather complicated. The engine starts well on opening the pilot jet, and I am not particular about slow running with throttle closed. Is it all right to use the pilot only as a starter?—M.D.

(1.) Yes, we think Harcourt radiators would be an advantage. (2.) The tappets are adjustable by means of loose plates or discs of steel, and are quite satisfactory. We can suggest nothing better. (3.) Allowing the engine to tick over does not necessarily waste petrol, unless you allow the engine to run for any length of time with the car at rest. The adjustment of your carburetter appears correct. The pilot can be used as a starter.

Electrical Queries.

(1.) I have an accumulator, four volt twenty ampères, slightly sulphated. I propose to empty out the acid, rinse, and fill with distilled water, having dissolved in it a small lump of common soda, then to charge lightly till the sulphate falls off to the bottom of the case. Finally, rinse, add acid, charge, and expect to have the accumulator in perfect condition again. Is this feasible? (2.) Can I rectify alternating current for charging by passing it through a series of aluminium plates in a strong salt solution? Plates $\frac{1}{16}$in. apart; wires connected to the outside plates only. Current 200 volts alternating to 4 volts 1½ ampères continuous.—W.F.J.

(1.) The treatment suggested might be successful, but the result is uncertain, and it would seem to be unnecessary considering the battery is only slightly sulphated. In that case, all that is required is a long slow charge, say half ampère, continued till the cell gases freely and the voltage is well up. This can easily be arranged from a house lighting circuit in series with a lamp or two lamps in parallel with each other. If all the sulphate does not disappear after the first charge, discharge at the normal rate and repeat the slow charge. (2.) The two problems of rectifying a current from alternating to continuous and transforming it from a high voltage to a lower one seem to be confused in this query. A resistance or transformer is necessary in the latter to bring the voltage down, and for this purpose a bank of lamps may be used just as in charging from direct current mains. The simplest form of rectifier consists in two plates—one aluminium and the other lead or iron. These plates are put in a glass or other suitable jar filled with strong alkaline solution, such as common soda or potash. This rectifier is wired in series with the lamp resistance and the iron or lead pole joined to the negative terminal of the accumulator. Current will then only flow in the required direction.

Licences.

In your edition of February 28th, you informed the purchaser of a second-hand motor cycle of the conditions under which he might obtain petrol for testing it. Will you kindly tell me if, for such a purpose, it would be necessary to (1) take out a driving licence (5s.) and (2) register the machine?—R.D.A.

It would be necessary to take out a driving licence (5s.), and, really, you ought to register the machine (5s.), as this step must be taken some time or other, and when once done the registration lasts as long as the machine is in your possession, also when the machine has been used on the road, you render yourself liable for taxation.

Disc Wheels, etc., on a Morgan.

(1.) I have disc wheels on my machine, and in mending a *front* tyre puncture I remove the outer disc, but the inside one is wired on. How can one get leverage enough to get the covers *off* with this disc in position? Usually I used to force over the lever to almost a right angle through the spokes. To remove the inner disc would be a long job also. (2.) Will you please tell me how to take up any side play in the front wheels? (3.) Is it advisable to carry a butt-ended tube for the rear wheel, and cut the old one out and have it re-jointed (in case of a bad puncture)? (4.) Do you consider Duco valve stem lubricators would be any real advantage on this engine? (5.) Is it practical to remove one cylinder at a time, and so leave induction pipe and carburetter standing?—G.A.R.

(1.) We cannot see that the inside disc interferes with the removing or putting on of a cover in the slightest degree. If the correct levers are used and a third hand or fitter's "stop," there is certainly no need to turn the lever so far as you describe. (2.) Remove the dust cap, and when this is done the nut and adjusting cone will be disclosed. The bearing is then adjusted in the ordinary manner. (3.) The idea of using a butt-ended tube is an excellent one, and we should advise you to carry one. If you like, you can remove your present endless tube and get it made into a Rich detachable type by the Thames Rubber Co., Ltd., 199, Upper Thames Street, London, E.C.4. (4.) Yes; the valve stem lubricators prevent air leakage at worn guides and lubricate and quieten the valve motion. (5.) Yes; but when the engine has to be dismantled there is no reason why you should not remove the whole induction pipe and carburetter. There is no advantage in leaving the carburetter standing.

Why a V Twin Magneto has no Distributer.

(1.) If a spark can be obtained at the plug points, twice per revolution of the armature, why is a distributer necessary for a car? It seems to me that there is a continuous current from the slip ring. (2.) Is a V twin of the J.A.P. type timed from the front cylinder (No. 1), and is a distributer used in this case, and how is the firing of No. 2 cylinder obtained so soon after No. 1 unless a continuous current is given out by the magneto, and not only at each maximum position of the armature?—G.R.T.

(1.) The construction of a four-cylinder car magneto contact breaker provides two sparks every engine revolution. In the case of a four-cylinder car, these sparks must be conducted one to each of the two cylinders in turn each revolution, and the distributer serves this duty. (2.) A distributer is not used in a V twin motor cycle engine because the armature revolves at half engine speed, and the contact breaker allows for the provision of a spark for each cylinder, because there are two cams, and contact is made and broken twice for each armature revolution. It does not matter whether the magneto is timed from the front or from the rear cylinder. Incidentally, the rear cylinder is conventionally described as No. 1. (See also next reply.)

Direction of Magneto Rotation and Width of Contact Gap.

(1.) Does the magneto of the average 3½ h.p. single turn at half engine speed? (2.) That is, does a spark occur at the plug at every maximum position of the armature, *i.e.*, twice per complete revolution, and if this is more often than every compression stroke there must be an unused spark occurring at the plug? (3.) When the current has been generated in the primary winding, and until the contacts break, does it complete its circuit through the magneto to the rocker arm, across the points (which at this time are together), and so to the primary winding again, and on the points breaking with the armature at its maximum position the complete circuit, *viâ* the magneto, is destroyed, and the sparking current is forced to complete its circuit *viâ* the plug? (4.) But if this is so, and that the points (platinum) are only for destroying or breaking the magneto circuit, why is it necessary that they should only open .4 mm. as in practice? Is it on account of their closing in time for the next maximum position of the armature?—G.R.T.

(1.) Yes. A magneto of a single-cylinder four-stroke engine revolves at half-engine speed. The two-stroke single-cylinder magneto revolves at engine speed. (2.) The spark only occurs when a break occurs at the contact breaker. Consequently, there is not an unused spark at the plug at any time. (3.) Yes. (4.) The distance .4 mm. is to prevent undue hammering of the points. If the distance were much greater the hammering action would be increased. Another reason is that if the gap were greater the period of contact might be reduced too much.

Making an Engine.

(1.) I have a cylinder 76 mm. bore and 7⅛in. long (internal measurements). The piston is 3in. long. The valve chambers are 1⅝in. diameter and ¾in. deep. What will be the best compression ratio I can get? (2.) What will be the best lengths to make the connecting rod and the stroke? (I am in a position to get materials to make up this engine, hence my asking your advice.) (3.) Would Hoffmann ball bearings, pattern L10 or LS10, be suitable for main bearings? They are 1in. bore and ⅝in. on face. (4.) If the answer to above is negative, can you recommend phosphor bronze for plain bearings? (5.) What c.c. and h.p. should this engine develop, assuming it was made as well as by a first-class motor firm? (6.) What would be approximately the weight of a flywheel for this engine for fairly fast work on the road? Is it not possible to have two outside flywheels, say, a foot in diameter, one at each side, with the drive mounted inside one of them?—L.W.

(1.) The best compression ratio depends on the use of the engine and the design of the cylinder. You say later in your letter you require the engine for speed work, therefore you will want fairly high compression; but, on the other hand, the design of your cylinder may be such that it will not stand this, and, moreover, the interior form may also present difficulties in this direction. It is extremely difficult to advise you without an examination of the cylinder itself. Probably, if you arranged for a ratio of 4½ to 1 you would be safe. (2.) The of course, depend on a number of fact which you do not mention, and in c nection with your scheme generally, first thing you should do is to plan the engine roughly on paper and see h the parts work in. You will proba find when you have done this that s dimensions as those for which you will settle themselves by reference other matters. (3.) The bearings mention are rather light for the purp but would be preferable to plain be ings. (5.) The c.c. depends upon stroke selected; the horse-power upon formula used. By R.A.C. formula y cylinder would be rated at 3½ h.p. The weights of the flywheels might anything from 10 lb. upwards. Outs flywheels, of course, could be used.

To Overcome the Difficulties Imposed by the Paper Shortage

□ □ □

At the present time, owing to the shortage in the supplies of paper for printing purposes, the production of newspapers is beset with difficulties, but by eliminating chance sales—with the consequent risk of copies remaining unsold, which leads to paper being wasted—it is hoped that the weekly demand for *The Motor Cycle* can be met, and all *regular readers* supplied with copies.

To those readers of *The Motor Cycle* who have given a definite order to their newsagents, the publishers tender their appreciation and thanks.

To those who have not yet done so, the publishers again make their urgent request that a definite order be placed at once.

Please give an order for "The Motor Cycle" to your Newsagent To-day.

Lubrication.

My motor cycle is a two-sp Allon. The country here (Henl on Thames) is very hilly, but to a fortnight ago I was able tackle all the hills on top g without the least trouble. In fact never opened the throttle fully. Ab a fortnight ago, on the eve of a l run, I found the following conditio (1.) The engine ran passably on level, but wanted the throttle m more open than previously for same speed. (2.) It knocked very m for ten yards when changing fr bottom to top or when picking (3.) It misfired and stopped sudde when opening the throttle fully at bottom of a hill when on top gear. It would not take any hill on top, l needed bottom gear. (5.) The sp was very slow compared with its pre ous speed. After a struggle to st it, and after a run of half a mile, suddenly shot away and climbed very stiff hill very fast on top ge After a ten minutes' stop it returr suddenly to conditions 1 to 5. T last few weeks I have used F Castrol lubricating oil, being unable obtain any other. The jet is compos of seven jets, and enables me to only about 40 m.p.g. The carburet is an Amac. I have never taken t engine to pieces. Would you kin tell me what, in your opinion, is wro with the engine? Is it *(a)* the oil, lack of grease in the gear box, *(c)* broken piston ring, or *(d)* too large jet?—J.M.A.F.

(a) The trouble is possibly due to t oil. Use only oil for air-cooled engin if possible. *(b)* Engine oil in the ge box. *(c)* You cannot tell this unless y take down the engine. Probably t rings are stuck up, and the engi requires to be decarbonised. *(d)* T general symptoms seem to indicate th the jet is choked, and the fact that t engine ran better on one occasion w probably because the partial obstructi cleared itself and then again chok the jet.

RECOMMENDED ROUTE.

REDDITCH TO WEYMOUTH.—E.F.

Redditch, Alcester, Stratford-on-Av Shipston-on-Stour, Chipping Nort Burford, Lechlade, Swindon, Woott Bassett, Calne, Melksham, Westbu Warminster, Shaftesbury, Blandfor Dorchester, Weymouth.

A·J·S

THE USE OF THIS BADGE

BRITISH · ASSOCIATION OF BRITISH MOTOR AND ALLIED MANUFACTURERS

is an indication that this Firm has been accepted as genuinely British by a Tribunal of Trade Competitors

To the query of "origin"

respecting the A.J.S.—the reply of "the man who owns one" would convey—additional to its being Best British—the fact of many original design-features which are responsible for uncountable awards, and high testimony from thousands of satisfied owners.

Original design-features common to each A.J S. model include Scientifically built Straight Tube Frame; Powerful, Silent, and Vibrationless A.J.S. Engine: All-enclosed Weatherproof Chain Transmission; Kick-starter with enclosed mechanism; Special Three speed Countershaft Gear; Patent Gate Change; Handlebar-controlled Perfect Multiple Plate Clutch; Forced lubrication direct to main bearings and big-ends; Internal Expanding Rear Drum Brake; Patent Spring Forks; Interchangeable Detachable Wheels; Ample-protective Mudguards; Weatherproof finish.

Owing to our being fully engaged on supplying Government requirements, we regret our inability to accept orders for delivery at present, but suggest that you place your name on our "Waiting List" for our earliest possible attention.

A. J. STEVENS & CO. (1914), Ld.
Graiseley House, WOLVERHAMPTON.
LONDON AGENT: H. TAYLOR & Co, Ltd.
Store Street, Tottenham Court Road.

BROOKS

Queries No.. 1

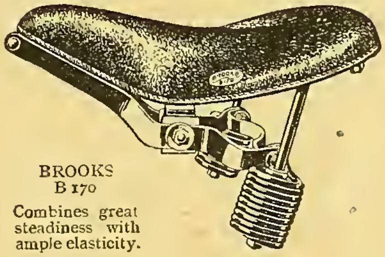
Do you know of any other fitment than a saddle which is so often taken from the old machine and fitted to the new?

Do you know of any other saddle than a BROOKS which is so constantly the subject of such transfer?

And the reason is that Saddle Ease depends on how the saddle "fits" you and—

That no other saddle after wear can fit you like a BROOKS.

J. B. BROOKS & Co. Ltd.
49 Criterion Works
BIRMINGHAM.



BROOKS
B 170
Combines great steadiness with ample elasticity.

SATISFACTION!

"Satisfaction"—what does that mean in buying a second-hand machine? People's ideas of satisfaction vary. Let us tell you what we mean when we state that we give satisfaction. Let us reconstruct a deal, any of the 250 sales we have conducted this year:

1. **You write to us** in answer to our advertisement. Your letter receives prompt and courteous attention. You ask perhaps for our advice in choosing a mount. We give it willingly to the best of our ability, and we recommend the machine we think the most suitable to you, **not** the one that shows us the greater profit. Perhaps you ask for details of a machine advertised. You do not receive in return a scanty note saying that the machine advertised is in "good condition." Instead, you receive a comprehensive printed report—giving a detailed description of every part of the machine—the make and condition of engine, gears, tyres, carburetter, magneto, controls, etc.; the condition of plating and enamel, the maximum and minimum speed, the consumption, the engine and frame numbers for verification of date—in fact, an absolutely comprehensive and exact detailed description of every part of the machine. Write to us for the specification of any machine advertised, compare it with the specifications given by other firms, and judge us by the results.

2. **You place an order** for a machine—perhaps without seeing it. You want to receive the machine in good order; we want you to have it in good order. Therefore we have instituted a comprehensive test report. Every part of the machine is checked before despatch, and the machine is tested for ease of starting, flexibility, hill-climbing, etc. In fact, it passes as complete a test as a new machine prior to leaving the works. The mechanic who carries out the test signs a report on it before the machine is despatched, and you may rest assured that the machine will arrive complete and ready for the road in every way.

3. **You receive the machine.** We have assured ourselves that it is as perfect as can be before despatch. But perhaps after you have got it, you think you would have preferred some other type. Buying a second-hand machine is often a difficult matter if you are not sure of the exact kind of machine you want. That is where our **exchange service** comes in. No matter however perfect the machine we have sold you, we are always ready to exchange it entirely free of charge for any other of not less value on our list **within three weeks of purchase.** Thus, when you buy from us, you can be sure of getting what you want—if not the first time, then the second or third time.

4. **After you have bought the machine** our interest in you does not cease. You have become a customer of ours, and we want to keep you a customer of ours. We shall at all times be willing and glad to assist you with our advice or help in any way regarding motor cycling; we have in the past given you the best of our service, and with every new client we make, we try our best to make it a case of "Once a customer, always a customer."

5 **Present circumstances.** Under War conditions motor cycling is not easy. Restrictions abound at every turn. But, after the War, the shortage of machines will be enormous. Be wise—place your order in time. Write to us for details of how to reserve a New or Second-hand Machine of any make for after-the-War, and how to pay for it now—whilst you cannot use it—by means of small instalments. Below we give a selection from our Stock, every machine being ready for immediate delivery.

SELECTION FROM STOCK:

1.	**A.J.S.,** 1915, 2¾ h.p., 2-speed, clutch, kick-starter	**39 gns.**
2.	**ALLON,** 1916, 2-speed, 2-stroke	**27 gns.**
3.	**ALLON,** 1917, 2-speed, 2-stroke, clutch, run 250 miles	**36 gns.**
4.	**AMERICAN EXCELSIOR,** 1917, 8 h.p., 3-speed, dynamo lighting Combination	**85 gns.**
5.	**ARIEL,** 1916, 3½ h.p., 3-speed, countershaft	**49 gns.**
6.	**BAT-J.A.P.,** 1914, 6 h.p., 3-speed, 2-seater Sidecar	**39 gns.**
7.	**B.S.A.,** 1915, 4¼ h.p., 3-speed, chain drive	**45 gns.**
8.	**B.S.A.,** 1916, 4¼ h.p., 3-speed, chain-cum-belt	**53 gns.**
9.	**B.S.A.,** 1913, 3½ h.p., 2-speed, clutch	**25 gns.**
10.	**BRITISH EXCELSIOR,** 1916, 2-stroke, 2-speed, clutch	**25 gns.**
11.	**CALTHORPE,** 1915, 2-stroke, 2-speed	**23 gns.**
12.	**CALTHORPE,** 1915, 2¾ h.p., 2-speed, clutch, J.A.P.	**24 gns.**
13.	**CALTHORPE,** 1915, J.A.P., 2-speed, clutch, renovated	**24 gns.**
14.	**CAMPION-J.A.P.,** 1915, 4¼ h.p., Jardine gear-box	**37 gns.**
15.	**CLYNO,** 1915, 2-speed, clutch, 2-stroke, renovated	**28 gns.**
16.	**CRESCENT,** 1916, 2-speed, 2-stroke, very fast	**26 gns.**
17.	**CARDEN MONOCAR,** 1915, 2-speed, de Luxe, very smart	**59 gns.**
18.	**DOUGLAS,** 1913, T.T., 2-speed	**27 gns.**
19.	**DOUGLAS,** 1914, 2¾ h.p., 2-speed, clutch, kick-starter	**33 gns.**
20.	**DIAMOND,** 1916, 3 h.p., 2-speed, clutch, 4-stroke	**29 gns.**
21.	**ENFIELD,** 1915, 3 h.p., 2-speed	**32 gns.**
22.	**ENFIELD,** 1916, 3 h.p., 2-speed, as new	**41 gns.**
23.	**ENFIELD,** 1916, 6 h.p., Colonial model Combination	**72 gns.**
24.	**ENFIELD,** 1916, 6 h.p., Standard model Combination	**69 gns.**
25.	**F.N.,** 1913, 5-6 h.p., 2-speed, clutch	**29 gns.**
26.	**HUMBER,** 1918, 6 h.p., 3-speed, flat twin Combination	**85 gns.**
27.	**HUMBER,** 1918, 3½ h.p., 3-speed, flat twin, brand new	**£75 0**
28.	**HUMBERETTE,** 1914, air-cooled, perfect	**75 gns.**
29.	**HOBART,** 1915, 2¾ h.p., 3-speed, lady's model	**29 gns.**
30.	**INDIAN,** T.T., 5 h.p., 3-speed, disc wheels, 1916	**48 gns.**
31.	**INDIAN,** 1915, T.T., 7-9 h.p., clutch	**37 gns.**
32.	**INDIAN,** 1915, 7-9 h.p., T.T., clutch, disc wheels	**37 gns.**
33.	**INDIAN,** 1914, 7-9 h.p., 2-speed Combination	**52 gns.**
34.	**INDIAN,** 1914, 7-9 h.p., 2-speed, spring-frame	**35 gns.**
35.	**INDIAN,** 1914, 7-9 h.p., T.T., clutch	**29 gns.**
36.	**IVY-PRECISION,** 1914, 4¼ h.p., 3-speed, coach Sidecar	**37 gns.**
37.	**JAMES,** 1914, 4¼ h.p., 3-speed	**34 gns.**
38.	**JAMES,** 1916, 2½ h.p., 2-stroke, 2-speed	**26 gns.**
39.	**J.H.,** 1916-17, 8 h.p. M.A.G., Sturmey gears, coach Sidecar	**89 gns.**
40.	**KERRY-ABINGDON,** 1914, T.T., 4 h.p.	**22 gns.**
41.	**LEA-FRANCIS,** 1915, 3½ h.p., twin J.A.P., countershaft	**46 gns.**
42.	**LEVIS,** 1916 Popular, as new	**22 gns.**
43.	**LINCOLN-ELK,** 1913, 3½ h.p., variable gear	**18 gns.**
44.	**MOTOSACOCHE,** 1916, 3½ h.p. twin, Enfield gears, as new	**44 gns.**
45.	**MOTOSACOCHE,** 1914, 3½ h.p. twin, Enfield gears	**31 gns.**
46.	**MATCHLESS,** 1913, 6 h.p., 2-speed, coach Combination	**35 gns.**
47.	**MATCHLESS,** 1915, 8 h.p., 3-speed, coach Combination	**59 gns.**
48.	**MORGAN,** 1915, 10 h.p., Grand Prix, J.A.P.	**89 gns.**
49.	**MORGAN,** 1914, 8 h.p., air-cooled J.A.P., red finish	**76 gns.**
50.	**NEW HUDSON,** 1914, 3-speed, Big Six Combination	**47 gns.**
51.	**NEW HUDSON,** 1915, 3-speed, Big Six Combination	**52 gns.**
52.	**NEW HUDSON,** 1915, 3½ h.p., 3-speed Combination	**39 gns.**
53.	**NEW HUDSON,** 1916, 2-speed, 2-stroke	**25 gns.**
54.	**N.S.U.,** 1913, 3 h.p., 2-speed twin	**19 gns.**
55.	**NEW IMPERIAL,** 1915, 2-speed J.A.P.	**23 gns.**
56.	**NEW IMPERIAL,** 1916, 2-speed J.A.P.	**27 gns.**
57.	**NORTON,** new 1918 Military 3-speed model	**79 gns.**
58.	**N.U.T.-J.A.P.,** 1915, 3½ h.p. twin, 3-speed, clutch, kick-starter, disc wheels, T.T.	**48 gns.**
59.	**O.K.-J.A.P.,** 1916, 2-speed, clutch	**26 gns.**
60.	**O.K.-PRECISION,** 1914, 4 h.p., T.T.	**19 gns.**
61.	**P. & M.,** 1912, 3½ h.p., 2-speed, clutch, renovated	**22 gns.**
62.	**PRECISION,** 1913, 3½ h.p., 2-speed	**22 gns.**
63.	**PREMIER,** 1915, 2½ h.p., clutch, lightweight	**23 gns.**
64.	**PREMIER,** 1913, 3½ h.p., 2-speed, clutch	**24 gns.**
65.	**PREMIER,** 1913, 3½ h.p., 3-speed, Sidecar	**31 gns.**
66.	**PREMIER,** 1914, 3½ h.p., 2-speed, countershaft	**29 gns.**
67.	**PREMIER,** 1914, 3½ h.p., 3-speed Combination	**36 gns.**
68.	**PREMIER,** 1915, 3½ h.p., 3-speed Combination	**45 gns.**
69.	**QUADRANT,** 1913, 4¼ h.p., 2-speed, clutch	**27 gns.**
70.	**RUDGE-MULTI,** I.O.M., 3½ h.p., T.T., clutch, as new	**58 gns.**
71.	**RUDGE,** 1915, 5-6 h.p., 3-speed, Rudge Sidecar	**45 gns.**
72.	**RUDGE-MULTI,** 1914, renovated	**37 gns.**
73.	**RUDGE-MULTI,** 1914, 3½ h.p. Combination	**38 gns.**
74.	**RUDGE,** 1913, T.T.	**25 gns.**
75.	**ROVER,** 1913, 3½ h.p., clutch	**23 gns.**
76.	**REX,** 1915, 8 h.p., T.T., clutch, handle-start	**32 gns.**
77.	**RUDGE,** 1915, 3½ h.p., single-speed	**27 gns.**
78.	**ROYAL RUBY,** 2-stroke, 1915, renovated	**22 gns.**
79.	**SCOTT,** 1912, 3¾ h.p., 2-speed, clutch, kick-starter	**23 gns.**
80.	**SCOTT,** 1913, 3¾ h.p., 2-speed, clutch, kick-starter	**29 gns.**
81.	**SCOTT,** 1914, 3¾ h.p., 2-speed, clutch, kick-starter	**34 gns.**
82.	**SCOTT,** 1914, Canoelet Combination	**39 gns.**
83.	**SINGER,** 1913, 3½ h.p., clutch	**23 gns.**
84.	**SINGER,** 1914, 2¾ h.p., T.T., clutch	**21 gns.**
85.	**SHEFFIELD-MINOR,** 1916, 2-stroke, as new	**21 gns.**
86.	**SUN-VILLIERS,** 1916, 2-stroke, single-speed	**18 gns.**
87.	**SUN-VILLIERS,** 1916, 2-stroke, 2-speed	**24 gns.**
88.	**SWIFT CYCLE CAR,** 1915, 8-10 h.p., 2-seater	**119 gns.**
89.	**TRUMBULL,** 1915, Light Car, 12 h.p., 3-speed, 4-cylinder	**79 gns.**
90.	**T.D.C.,** 1917, 2-stroke, as new	**19 gns.**
91.	**T.D.C.,** 1915, 2-speed, 2-stroke	**22 gns.**
92.	**TRIUMPH,** 1913, T.T., 3-speed	**29 gns.**
93.	**TRIUMPH,** 1914, 4 h.p., 3-speed	**34 gns.**
94.	**TRIUMPH,** 1914, T.T., 4 h.p., clutch	**32 gns.**
95.	**TRIUMPH,** 1913, T.T., clutch	**25 gns.**
96.	**TRIUMPH,** 1913, T.T., single-speed	**22 gns.**
97.	**WOOLER,** 1915, 2-stroke, 2-speed, spring-frame	**29 gns.**
98.	**WOLF,** 1916, 2-stroke, good order	**19 gns.**
99.	**VELOCE,** 1916, chain-drive, 2-speed, 2-stroke	**26 gns.**
100.	**WILLIAMSON,** 1915, 8-10 h.p., water-cooled Combination	**65 gns.**
101.	**ZENITH-GRADUA,** 1914, 4 h.p., renovated	**34 gns.**
102.	**ZENITH-GRADUA,** 1916, 4-5 h.p. twin, as new	**52 gns.**
103.	**ZENITH-GRADUA,** 1915, 4-5 h.p. twin, countershaft	**49 gns.**
104.	**ZENITH-GRADUA,** 1915, 8 h.p., coach Sidecar, hood, screen	**65 gns.**
105.	**ZENITH-GRADUA,** 1915, 8 h.p., countershaft Combination	**49 gns.**

Any machine sent on "The Motor Cycle" deposit system.

RIDER TROWARD & CO., 31 & 40b, High Street, HAMPSTEAD, N.W.3.

'Phone: Office, 5392; Works: 4904, Hampstead. Open till 7 p.m. and Sundays. One minute Hampstead Tube.

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns First 12 words or less 1/6, and 3d. for every ɔ words after. Each paragraph is charged arately. Name and address must be counted. ies discounts, conditions, and special terms regular trade advertisers will be quoted on plication.

Postal Orders sent in payment for adverements should be made payable to (& Co.) FFE & SONS Ltd., and crossed

All advertisements in this section should be companied with remittance, and be addressed the offices of "The Motor Cycle," Hertford eet, Coventry. To ensure insertion letters ould be posted in time to reach the offices of The Motor Cycle," Coventry, or London (20, dor St., E.C.4), by the first post on Friday rning previous to the day of issue.

All letters relating to advertisements should ote the number which is printed at the end of cb advertisement, and the date of the issue which it appeared.

The proprietors are not responsible for clerical printers' errors, although every care is taken avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be dressed to numbers at "The Motor Cycle" Office. en this is desired, the sum of 6d. to defray the cost of istration and to cover postage on replies must be added the advertisement charge. Only the number will appear the advertisement. All replies should be addressed No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☞ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons y deal in perfect safety by availing themselves of our posit System. If the money be deposited with "The tor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the ods is three days, and if a sale is effected we remit the ount to the seller, but if not we return the amount the depositor, and each party to the transaction pays riage one way. For all transactions exceeding £10 in ue, a deposit fee of 2s. 6d. is charged; when under the fee is 1s. All deposit matters are dealt with at ventry, and cheques and money orders should be made yable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an lication that the advertiser is willing to avail himself of e Deposit System. Other advertisers may be equally sirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no swer to their enquiries are requested to regard the ence as an indication that the goods advertised have ready been disposed of. Advertisers often receive so any enquiries that it is quite impossible to reply to each e by post.

MOTOR CYCLES FOR SALE.

A.J.S.

914 6h.p. A.J.S. Combination, hood, screen; borgain, £56.—86, High Rd., Lee. [5303

A.J.S., 1917, 6h.p., 3-speed, special War Model, fitted with 700×80 tyres: £92.—Exeter Motor Cycle Co., td., Bath Rd., Exeter. [3520

A.J.S., 6h.p., 3-speed special war model, 700×80 tyres, brand new machine; cost £92, what cash fers?—15, King Edward's Av., Chelmsford. [5339

A.J.S., 2¾h.p., 2-speed, lamp, horn, £35; 1914 2¾h.p., 3-speed, Lucas lamp, mechanical horn, spare tank, 42/10: new Military Model also supplied; E.P. or exhange.—Service Co, 292, High Holborn, London. [X4521

1916 4h.p. A.J.S., 1917, sidecar, spare wheel, hood, screen, tools, spares, lamps, speedometer, mehanical horn; £80.—Stevenson, 27, Howe St., Edinurgh. [5245

1915¾ A.J.S. 4h.p. Combination, lamps, horn, speedometer, tools, and spares, perfect condition; good ightweight considered in part exchange; what offers? -28, Belmont Rd., Wolverhampton. [X4452

A.J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; 91/6: no permits required.—P. J. Evans, sole agent or Birmingham and district, 87-91, John Bright St., Birmingham. [4945

IF IN NEED OF A Motor Cycle or Combination

EITHER FOR WAR WORK or BUSINESS PURPOSES, WRITE TO

GODFREY'S LTD.

They can supply you from stock, and you can rely on getting value for your money.

SEND FOR FULL LIST OF NEW AND SECOND-HAND MACHINES.

EASY TERMS.

GODFREY'S LTD.

208, Gt. Portland Street, LONDON, W.1.

'PHONE: 7091 MAYFAIR (2 Lines).

You would not take your watch to a Blacksmith for repair — neither should you take your

DIXIE OR SPLITDORF MAGNETO

for repairs or spares elsewhere than to the direct factory representatives:

American Supplies Co. Ltd.

162 Grt. Portland Street, LONDON. W.1

'Phone: Mayfair 3258.

DI-X-IE

CLEAN ALUMINIUM, BRASS, and GUNMETAL

CASTINGS

For AIRCRAFT, MOTORS, and MOTOR CYCLES

SAMUEL F. ROGERS

(Metallurgical Chemists & Metallographists),

CALEDONIAN WORKS, PRINCE'S END, TIPTON.

IMPORTANT NOTICE.

Owing to the Whitsun Holidays, the issue of "The Motor Cycle" for May 23rd must be closed for press earlier than usual. All copy and instructions for Miscellaneous Advertisements in that issue must, therefore, be in our hands not later than first post on Thursday, May 16th.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. 1915½ 6h.p. De Luxe Combination, special engine, detachable wheels, spare wheel with voiturette tyre and waterproof cover, special wind screen, apron, Lucas horn, head, side, and tail lamps, speedometer, watch, trunk, straps, waterproof covers, several spares, fast machine, sparingly used, perfect condition: £87/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5291

A.J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [4937

Alldays.

2½h.p. 2-speed Allon, 1914 model; price £17/10, bargain.—Wauchope's, 9, Shoe Lane, London. [5283

ALLDAYS Allon, 2-stroke, 2-speed, 2¾h.p., 1916, little used, perfect; £28.—Broom, 77, Marylebone Lane, W.1. [X4450

ALLON, 2¾h.p. single, £38, new; 2-speed, £45, new; 2-speed and hand clutch, £48, new; 2-speed, £28/10; E.P., or exchange.—Service Co., 292, High Holborn, London. [X4513

ALLON, 2¾h.p., brand new, 2-stroke, never been on the road, and guaranteed; reduced price £32.—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [5332

Ariel.

1914 6h.p. Ariel Combination, 2-speed, powerful: £40.—86, High Rd., Lee. [5304

ARIEL 1914 5-6h.p. Twin, 3-speed countershaft, kick start, Bosch mag., Senspray, C.B. sidecar, electric lighting, tyres perfect; £48.—Williams, 2, Beaconsfield Rd., New Southgate. [5347

ARIEL, with C.B. sidecar, latest 3½h.p., 3-speed countershaft, only run 250 miles, indistinguishable from new; cost £83, accept £62; first-class lightweight part payment considered.—Dodd, Post Office, Audley, North Staffs. [X4490

Bradbury.

1915 (late) 6h.p. Bradbury and Sidecar; offers wanted —27, High St., Doncaster. [5235

Brough.

1913 4h.p. Brough, single, free engine; £26.—46, Ampthill Rd., Bedford. [5265

B.S.A.

1916 Brand New B.S.A., £55.—Horace S. Yaker, 16, Swallow St., Piccadilly Circus. [5194

B.S.A., late 1916, chain drive, 3-speed, 4¼h.p.; £46. —Hastewell, Haltwhistle, Northumberland. [5178

B.S.A., I.O.M. model, 3-speed; £37/10; E.P. or exchange.—Service Co., 292, High Holborn, London. [X4520

FOR Sale, one gent's 1h.p. motor cycle, B.S.A. frame. —For particulars apply to Nelmes, Yearby, Redcar. [5214

4¼h.p. 1917 B.S.A., 3-speed, free engine, and kick starter model, fitted with the best accessories, condition mechanically as new; £57/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5295

1915 B.S.A., 4¼h.p., 3-speed countershaft, chain drive, Lucas lamps and horn, perfect order, fitted gas container on carrier; £50.—Apply (letter), Barnard, Graystones, Cambridge Rd., Linthorpe, Middlesbrough. [X4361

4¼h.p. 1916 B.S.A., 3-speed countershaft model, all-chain drive transmission, clutch, kick starter, condition almost as new, includes accessories; price £55; a new B.S.A. De Luxe sidecar is available, and can be fitted at once if required.—Wauchope's, 9, Shoe Lane, London. [5292

Calthorpe.

1915 2¾h.p. Calthorpe-Jap, nice condition; bargain, £22.—86, High Rd., Lee. [5311

1914 Calthorpe-Jap, 2-speed; £18; exchange cycle and cash.—Bakewell, 30, Middlemarch Rd., Coventry. [X4499

LATE 1917 Calthorpe-Jap, 2¾h.p., 2-speed, used 200 miles only, as new; £28.—Grove, Llanthony Abbey, Gloucester. [X4273

MOTOR CYCLES FOR SALE.

Calthorpe.

1914 2¾h.p. Calthorpe, perfect order, 2-speed, Precision engine, new tyres; cheap.—Box L6,204, c/o *The Motor Cycle.* [5272

CALTHORPE-PRECISION, 2-speed, fitted paraffin or substitute, free engine, perfect condition; 27 gns. —136, Harrington Rd., South Norwood, London. [5184

2½h.p. Calthorpe, 2-stroke, 2-speed model, 1915 machine, but little used, including accessories; £22/10, bargain.—Wauchope's, 9, Shoe Lane, London. [5287

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [4947

Campion.

CAMPION, 2½h.p. J.A.P., perfect condition; £27, or nearest offer.—Franks, 175, Alfred St., Nottingham. [X4359

Chater-Lea.

1915 8h.p. Chater Combination, 3-speed, hood, screen; bargain, £54.—86, High Rd., Lee. [5324

8h.p. Chater-Lea and Sidecar, 1911-12, 3 speeds, handle start, chain driven, good condition; cheap.—2, Bellenden Rd., Peckham, S.E. [5274

Clement.

2¼h.p. Clement, new U.H. mag., B. and B.; bargain, £8/10.—152, Camberwell Grove, Camberwell. [5240

Clyno.

CLYNO 1917 Combination, War Model, hood, screen, and spare wheel complete, mileage 550, outfit as new.—Offers to Hunter, Marldene, Ford, Midlothian. [5246

Connaught.

GENUINE Bargain.—Connaught, 1915, 2¾h.p., Druids, Dixie mag., good order, beautiful machine; will accept £16/10 to clear.—P. Webster, Warwick Rd., Kenilworth. [X4489

De Dion.

DE DION, 2¾h.p., battery, torpedo tank, low, sporty, rebored, wants slight adjusting; £5.—Dixey, 49, Idlecombe Rd., Tooting. [5197

Douglas.

2¾h.p. 1914 Douglas: £35; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5293

1913 2¾h.p. Douglas, 2-speed, electrically equipped; £34.—86, High Rd., Lee. [5305

1912 Douglas, fixed gear, Brooks, footboards, lamp; £18.—46, Ampthill Rd., Bedford. [5262

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

1914 Douglas, speedometer, lamps; £33.—Blackburn, 22, Model Cottages, East Sheen, S.W. [5244

1914 Douglas, 2¾h.p., 2-speed, T.T.; £35.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0491

DOUGLAS, 1915, 2-speed, splendid condition, all accessories; £36.—Shillan, 37, Atherton Rd., Forest Gate. [5298

1913 Douglas, 2¾h.p., 2-speed, very little used, and in good order; £25.—Whale, 56, Townshend Rd., N.W.8. [X4353

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50. [5855

1913 Douglas, 2-speed, new heavy Dunlop, unused 3 years, excellent condition; £22.—116, Seabrook Rd., Hythe, Kent. [5255

DOUGLAS, 2-speed, Bosch, £16/16; Dixie magneto, single, £4/10; two Renolds chains, inch pitch.—38, Carisbrooke Rd., Walthamstow. [5207

DOUGLAS, late 1913, specially tuned T.T. model, 2-speed, 140 m.p.g., hardly used, really exceptional; £30.—Box L6,211, c/o *The Motor Cycle.* [5350

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

1914 Douglas, 2¾h.p., 2-speed, T.T., fully equipped, enamel and plate not scratched; £30, or exchange piano.—W. H. Marriott, 60, Kingston Rd., Earlsdon, Coventry. [X4534

DOUGLAS, new December, 1914, 2 speeds, only used few months, equal to new, speedometer, lamps, and all usual accessories; £35.—436, Whitehorse Rd., Thornton Heath. [5269

1913 Douglas, 2¾h.p. twin, 2-speed gear, footboard, usual accessories, splendid condition, very fast; £25.—R. Bamber and Co., Ltd., 33, Liverpool Rd., Birkdale, Lancs. Tel.: 44. [4858

1915 Douglas, 2¾h.p., 2-speed clutch model, head and rear lamps, speedometer, and mechanical horn; this machine is practically brand new, and in top hole order; price £43.—Below.

1916 Douglas, 2¾h.p., 2-speed, fitted with both lamps and Lucas horn, excellent condition; price £40.—Below.

1912 Douglas, 2¾h.p., 2-speed clutch model, Lucas lamps, horn, all in fine order; a bargain, £22.—Bromley Motor and Engineering Works, Masons Hill, Bromley, Kent. 'Phone: 961. [5182

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Latest model **T.T. ROVER,** with Philipson pulley, not done 250 miles; maker's list price to-day £67 10s., our price **42 Gns.** only. A saving of nearly £24. Very much below trade price.

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1918 **LEVIS** 2½ h.p., 2-stroke	**35 Gns.**
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1917 **ROVER,** 3-speed clutch	**£80 0 0**
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1917 **ROVER,** T.T., slightly shop-soiled	**52 Gns.**

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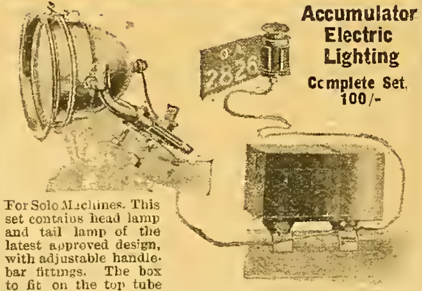

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Complete Set, 100/-

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1912 2¾h.p. Douglas, 2-cyl., clutch, Bowden trols, 2 speeds, excellent condition, tyres goo Carleton and Tulloch, 15a, Down St., Piccadilly, 'Phone: Mayfair 1037. [0

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1917 4h.p. Models A. and B. Douglas, 2¾h.p. M W., also U. and V. 1916 specification, absolu new; immediate delivery against Priority Permit doctors, farmers, war and munition workers.—How where to apply, full particulars, write Douglas Special Robinson's Garage, Green St., Cambridge. [5

Enfield.

1914 3h.p. Enfield, 2-speed, nice condition; £2 86, High Rd., Lee. [5

ENFIELD 3h.p., 2-speed, twin, overhead val Model 140, new, run 80 miles; 50 gns.— L6,207, c/o *The Motor Cycle.* [5

1916 Enfield Combination, all brand new Palmer ty Lucas lamps, speedometer, perfect conditi £70.—Grove, Llanthony Abbey, Gloucester. [X4

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto spe G.T. Model, £57/10; delivery from stock.—Ex Motor Cycle Co., Ltd., Bath Rd., Exeter. [3

1916 Enfield Combination, 6h.p., lamps, horn, sp did condition throughout; £75.—Elce and 15-16, Bishopsgate Av., Camomile St., E.C. [0

1915 3h.p. Twin Enfield, Lucas lamp, rear la horn, and tools, done 2,000 miles only, gua teed as new; £29.—Missin, Cottingham, Hull. [X4

ENFIELD Late 1915 Combination, £75; 1916 c bination, splendid order, 80 gns.; E.P. or changes.—The Service Co., 292, High Holborn, W. [X4

2¼h.p. 1916 Enfield, 2-stroke, 2-speed model; ha little machine, mechanically sound as n £37/10; guaranteed.—Wauchope's, 9, Shoe Lane, L don. [5

ENFIELD 3h.p. Twin, late 1915, little used, new coachbuilt sidecar; £48, including lan tools, spares.—Gregg, 19, Clifford Rd., E. Finch London. [5

ENFIELD 6h.p. Combination, July, 1916, mile about 2,000, Lucas lamps, latest Enfield scr not used since October; any examination; £75.— Bromsgrove Rd., Redditch. [X4

ENFIELD Combination, 1913, 6h.p., complete w lamps, horn, speedometer, and full kit of to thoroughly overhauled; best offers.—S. Brooke, 4, W acre St., Deighton, Huddersfield. [5

6h.p. Enfield Combination, 1916 model, with dyna lighting set and speedometer, has not been u much, and is in beautiful condition; will deliver road up to 60 miles to purchaser; £79; at Mansfiel Box 1,939, c/o *The Motor Cycle.* [X4

FOR Sale, Royal Enfield motor cycle and coachb sidecar, 6h.p. twin-cyl. J.A.P. engine, late 19 self-starter, electric lighting, Hans Renold chains, m age 2,500, perfect condition.—Price and full particul apply, Moody Bros., Blyth Motor Garage, Blyth, No umberland. [0

6h.p. 1915 Royal Enfield Combination, Lucas dyna lighting set included, £77/10; also a 1917 mo combination, fitted with all accessories, £87/10; 1 model combination, £35; also a 3h.p. 2-speed solo mo £32/10; all guaranteed.—Wauchope's, 9, Shoe La London. [5

F.N.

2¾h.p. F.N., C.A.V., B. and B.; £12.—80, Gra moor Rd., Higher Openshaw, Manchester. [X4

Grandex.

GRANDEX-PUP, 2-speed gear, in good order; £ or will exchange for lathe or milling machine.— Goldhawk Rd., Shepherd's Bush, London. [5

Harley-Davidson.

1915 7-9h.p. Harley Combination, very good ord £54.—86, High Rd., Lee. [5

1917 Harley-Davidson, De Luxe sidecar; of wanted.—27, High St., Doncaster. [5

HARLEY-DAVIDSON Combination, 1916 model, beautiful condition; £65.—Pepper and Co., Si St., Enfield. [5

HARLEY-DAVIDSON Combination, 1915, elec model, Swan sidecar, excellent condition; £6 46, Hillcrest Rd., Acton. 'Phone: 1578 Chiswick. [5

1915 Harley Combination, in excellent conditi mileage under 3,000; this outfit is a good gain at £65.—Whale, 56, Townshend Rd., N.W.8. [X4

1917 Harley-Davidson Combination, 7-9h.p., n model, lamps, horn, unscratched condition; £1 —Elce and Co., 15-16, Bishopsgate Av., Camomile E.C.3. [0

HARLEY-DAVIDSON, single-cyl. 2-speed mo £68 model, never used; what cash offers? or change Ford modern car.—Buckingham, Rindal Chelmsford. [5

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Balance and Torque.

An interesting discussion has been started in our pages on the respective merits of balance and torque. This was begun by a contributor who in our issue for March 21st sang the praise of the vertical twin with a single crank throw. As our readers know, this engine has even firing intervals, one per revolution, as in the case of the flat twin or single two-stroke. On the other hand, the balance is the same as in a single-cylinder engine, or perhaps slightly worse, owing to the fact that the double number of reciprocating parts, which rise and fall together, must be of greater weight. There is, however, no couple which is found to excess in the vertical twin with cranks set at 180°, and in a less degree in most flat twins, the exceptions being those engines which have a three-throw crank and a forked connecting rod. Some flat twins are built with narrow roller bearings which enable the cylinders to be almost in line and consequently reduce the couple to small proportions, but nevertheless it is there.

Our contributor compared this engine with both the V and flat twins, very much to its advantage in each case. Some of the claims may be admitted. It has more even firing than the V twin, is more accessible than the flat engine, and more easily fitted into the usual diamond frame. Also we may grant that it is better cooled than either of its competitors. The disadvantages are stated to be greater width and less perfect balance, but it is suggested that in the case of the V twin this disadvantage is theoretical only. This is incorrect—it is actual; the least possible unbalanced mass being something like half as much again as in the V twin, depending upon the cylinder angle of the latter. We refer, of course, to the angles generally in use, say 60°: in a 90° twin the difference is much greater, for a 90° twin can be very well balanced.

The writer then contends that torque is better than balance, and gives as an example a twin with one cylinder firing intermittently. This can hardly be considered a good argument, for it is not likely that any machine will be comfortable to ride when it is running imperfectly. The balance is not affected, but the torque is. Granted! But similar discomfort might ensue were the balance to be entirely upset and the torque allowed to remain constant.

Another contributor (May 2nd) contends that this discomfort is due to the snatch which is naturally present with a light flywheel, and says that the more even the firing impulses the lower may be the effective weight of the flywheel. This is true in part only, and that is when a given number of explosions are taking place per minute. The minimum flywheel weight must depend upon the longest interval between explosions. Thus a lighter flywheel can be used on a V twin than on a single, and a still lighter one on a flat twin. Suppose the engines to be running at 1,000 r.p.m., the firing intervals will be .12 second in the single, .07 and .05 in the 60° twin, and .06 in the flat twin. As the longest interval controls the situation, the flywheel weight of the V twin must be calculated for .07 second.

With regard to torque, there seems to be some confusion between evenness of firing interval and rapidity of explosions. Would those who favour evenness of torque assert that the torque of a single is superior to that of a V twin with its slightly uneven intervals? If so we cannot agree.

Of course, torque may be greatly improved by increasing the weight of the flywheel, but in motor cycle practice, as distinct from the stationary gas engine, there is a limit in size and weight which is very soon reached; moreover, while a heavy flywheel improves the steady pulling of an engine, it detracts very much from its powers of rapid acceleration, which is not required in a stationary engine.

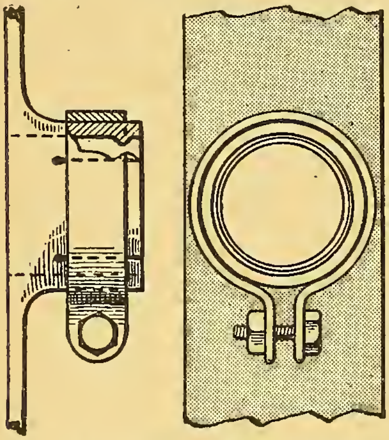
Our first contributor returns to the attack in our Correspondence columns, but we should like to have the views of other readers. The subject is an interesting one, and doubtless there is much to be said on each side.

An Index to the advertisements in this issue will be found on the page facing the back cover

IDEAS: Useful and Ingenious.

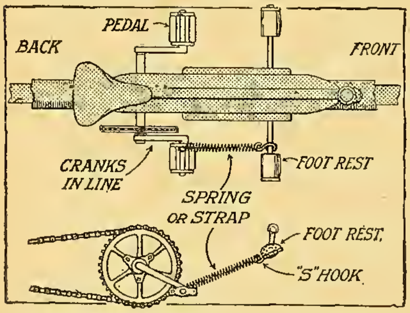
REMOVING MAGNETO BEARING.

I RECENTLY had difficulty in removing the hardened ball race from the spindle in the bearing of a well-known magneto. The sketch of a tool made for the purpose almost explains itself. A split boss is shown with lugs to rest on the vice jaws, the boss being bored with a bead to spring into the annular groove of the ball race. A clip ring holds the boss in position. The spindle can then readily be knocked out.—J. W. Riley.


A tool for removing a ball race in a magneto.

SPRING FOOTRESTS.

MOTOR cycles with pedalling gear usually have only one pair of footrest, and these are generally placed too far forward to afford really comfortable support. One or other of the pedals may also be used as a footrest, but these also are not very suitably placed for this purpose. The writer has effected a radical improvement by unkeying the combined chain wheel and crank and turning it to face forward, thus bringing the pedals in line instead of at 180°. The chain wheel crank must be the one that is unkeyed and fixed in the new position.



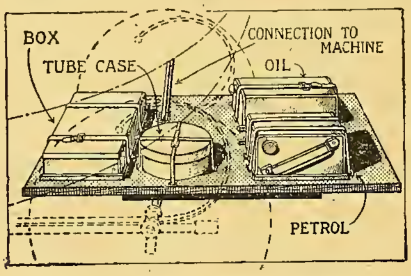
Showing how the pedals were utilised to form comfortable footrests.

A stout S shaped hook is secured to the pedal on the chain wheel side, and a heavy and springy piece of leather strap is cut to the right length to connect the pedal to the front footrest bar. The result is to support both pedals at such an angle as to afford all the comfort of an extra pair of footrests, plus the advantage of a certain amount of "give" obtainable by the use of slightly yielding leather. Alternatively, a very strong coiled spring can be incorporated to produce the same effect with, if need be, slightly more "give." The strap or spring can be detached in a moment when the engine has to be started up on the stand. It is impossible to wheel the machine backwards without first detaching the strap.—J. W. G. Brooker.

SIDECAR REFINEMENTS.

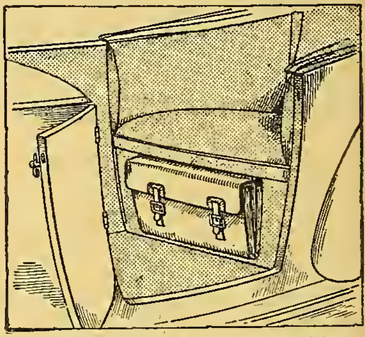
AS most sidecars are deficient in room for carrying spares, etc., perhaps two little fittings which I put on my machine would interest many sidecar enthusiasts.

First of all, I obtained a small waterproof schoolbag of the shoulder strap variety. This was placed on the front portion of the seat behind the passenger's legs, and, as my car was a wicker one, the straps were passed through the wicker and buckled up tightly beneath the sidecar, thus keeping the satchel in place. If a coachbuilt car, it could be tacked to the wood. Quite a lot of small things, such as plugs, maps, gloves, small spanner, etc., can be carried.



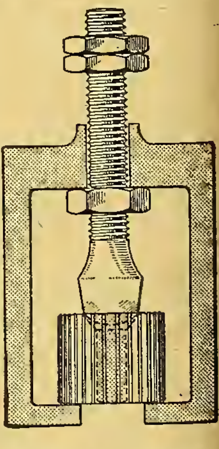
Showing how the luggage grid is bolted in position on the chassis.

I then made a luggage grid extending right underneath the sidecar, and projecting out at the back for about eighteen inches. I obtained a piece of strong board the width of the chassis between the springs, and length as stated. This was bolted to the chassis by two pieces of strip iron, bent to fit round the chassis tubes, and extending the whole length of the board for strength. The board was then covered with a piece of rubber matting, or linoleum would do. A narrow wooden beading was put round the edge of the board to make it neater. A small lock-up box was bolted to the board beneath the car to carry spares, such as valves, etc. On the opposite side of this a leather air tube case was screwed. Various slots were cut in the front portion of the board extending behind the car, to take straps for luggage, etc. When the grid is not required for a suit case, a tin of oil and one of petrol were easily carried on it.—W. Robb.


The waterproof school bag in position.

REMOVING A TIMING PINION SCREW.

WHEN taking down a Triumph engine, it is often an extremely hard job to remove the screw that holds the timing pinion on the mainshaft. By following the method as shown in the sketch, the work is fairly straightforward. The frame of a small wheel puller is used, the centre screw being removed. In its place a short screwdriver blade is fixed, the reverse end of which is screwed for about 2in. This screwdriver should be a perfect fit in the slot of the pinion screw, and should slide easily in the wheel puller frame. Three nuts are needed, the lower one being adjusted until the blade of the screwdriver beds down hard into the slot of the screw, the two top nuts being locked. The pinion screw can then be undone easily.


A device for facilitating the removal of the timing pinion screw.

Occasional Comments by Ixion

A Novel Flat Twin.

IT used to be granted that the overhead valve flat twin was a "beast to house" from the frame designer's standpoints. I hear of a new pattern, which overcomes two nasty snags in the general layout of a motor cycle. It has o.h.v. inclined at about 45° to the cylinder axis and mounted on the upper side of the cylinders. Valves of this design demand no greater overall clearance in the frame than a side valve flat twin, as they clear the down tubes of the frame. Further, the dynamo and magneto can be accommodated above the crank case without hoisting the tank above the usual level. If dynamos and overhead valves are to become standard the flat twin may yet prove one of the most easily housed engines.

Yet Another Transmission!

ANOTHER tame inventor has had a brain wave in the way of transmissions. This is claimed to be rigid and flexible yet employs no universal joints. Imagine a square shaft, made up of thin laminæ of spring steel, and you have it. I am not going to say that this type of drive will ever transmit high horse-powers or be efficient across broad gaps, but it is conceivable that it may make a practicable, cheap, and simple variation from the F.N. type of shaft so far as small motor cycle engines with short transmissions are concerned. I like to hear of all these new ideas bubbling in the motor cycling world. Many of them may prove absolute washouts, but they indicate that originality is abroad at last, and when we reflect that the 1914 motor cycle engine was in essentials a very near relation of a 3½ h.p. Minerva which startled the cognoscenti at a hill-climb thirteen years ago, it is evident that we had got into a groove.

In My Old Age.

I USED to dream dismally in my darker moments of the inevitable day when increasing age should disqualify me from using even a baby two-stroke with an electric starter. But yesterday I was hoisted into rosier views of my octogenarian years. I met a sportsman in a cripple chair of the sort which is normally propelled by doing a kind of treadmill stunt with the fingers on dummy belt rims affixed to the spokes. At first I fancied the occupant had been gassed, for a staccato barking cough seemed to emanate from him. Closer attention showed that he had an Auto-Wheel gummed to the back axle. I fell a-musing as to what he did if the engine stopped, and imagined that he appealed to the kindliness or cupidity of the first passer-by to get a fresh push-off. As I thought deeply on the subject the staccato bark ceased. A taxi had all but rammed the sportsman at four cross roads. I turned and rushed to offer my services. [Kindliness or cupidity?—Ed.] Not needed. His fingers slithered fiercely along the belt rims and the Auto-Wheel burst into renewed song. I thank that unknown motorist. Memories of him will brighten all my future birthdays.

A Raleigh Point.

I DARESAY many readers missed an interesting detail of the Raleigh F.T. engine, illustrated on page 357 of *The Motor Cycle* for April 11th. I place no great value on the gap left for cooling draughts to percolate under the magneto to the rear cylinder. No great draught would get through: and in any case it would impinge on the inlet pocket, which probably requires warming to procure a level circumferential temperature for the cylinder head, and so avoid distortion. Oddly enough, the designer has heated the centre of the inlet pipe by enclosing it bodily in the timing gear compartment of the crank case; but as he is doing his best to cool its extremities for some reason, it must feel like a camper sitting over a fire out of doors in winter. If such an engine belonged to me I should wad up the draught gap under the magneto, lag the whole of the exposed run of the inlet pipe, and expect to get rather nice running. We have travelled some distance since I saw the first Raleigh, which had a vertical single-cylinder engine mounted over the front wheel, and driving the rear wheel by *a crossed flat belt!*

The Ideal.

AS individual tastes vary in the selection of accessories, the production of "ready for the road" machines would be unpopular. Henry Ford turns his car out completely fitted for immediate use, and, though his clients are mainly drawn from a class which cannot afford to be fastidious, numerous firms make a fat living out of supplying Ford gadgets, and their catalogues are almost as portly as the "Encyclopædia Britannica." It follows that if the Triumph Co., for example, were to turn out a 'bus ready equipped with hooter, lamp, watch-holder, and speedometer, many of their clients would specify the naked model. On the other hand, it would be the easiest thing in the world for the manufacturers' association to standardise a set of accessory mountings for the several types of bicycle, and leave the accessory people to design a variety of patterns all furnished with the same size of clip. For example, the hooter might be clipped between two collars brazed to the bar before plating or threaded on a bolt projecting from the bar, etc. The combined brackets for acetylene lamps and generators might drop over a couple of studs mounted in the centre of the bar by its manufacturer. The hub gear wheels for driving speedometers could be standardised with consummate ease, and so forth. A day's work by the technical secretary of the manufacturers' association and a two-hour meeting of the members would settle such matters.

TIMING MECHANISM.

THE FIRST OF TWO ARTICLES DEALING WITH VALVE MECHANISM.

This Instalment treats of Timing Gears in Single-cylinder Motor Cycle Engines; the Second will be devoted to Twins.

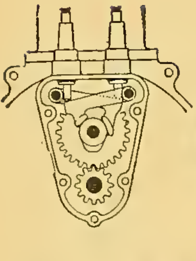


Fig. 1.—The valve gear of the single-cylinder J.A.P., using a single cam.

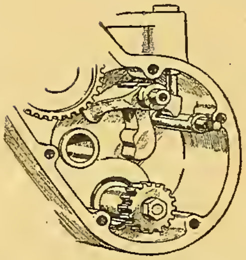


Fig. 2.—The 1915 Premier, with single cam and two rockers on one shaft.

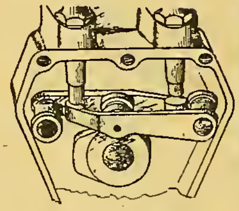


Fig. 3.—Blumfield engine, having two cams on a single wheel.

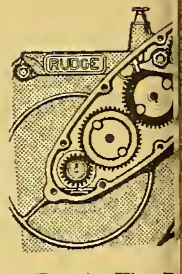


Fig. 4.—The R timing gear. Two on the last wheel c magneto drive trai

To the casual observer, most single-cylinder engines of the four-stroke type closely resemble each other. In a few cases, an unconventional disposition of the valves slightly alters the general appearance; but, generally speaking, all are so much alike that it may come as a surprise to many to know that at one particular point nearly every engine differs from its contemporaries. This is the lay-out of the timing mechanism, and, considering that its functions and the aims of the designer are almost identical in every case, the differences in applying the mechanism to carry out these functions form a most interesting subject.

One would imagine that the differences would be more numerous in the case of the twin-cylinder engines. It is, therefore, all the more surprising to find that divergences in the design of timing gears of V-twin units are considerably fewer in number than in the case of the single-cylinder engine of conventional design.

Broadly, we may divide the timing gears of single-cylindered engines into seven groups, employing the following:

(1) A single cam wheel and a single cam.
(2) A single cam wheel and a double cam.
(3) Two cam wheels with external cams.
(4) Two cam wheels with internal cams.
(5) One cam wheel and a camshaft.
(6) A camshaft for both cams.
(7) Unorthodox mechanism.

Most of these groups can be subdivided in connection with the rocker mechanism, under which heading we can make up the following groups:

(A) Those designs embodying no rockers.

(B) Those designs with "slipper" or approximately straight rockers.
  (*a*) Opposed.
  (*b*) Crossed.
  (*c*) Placed in tandem.

(C) Those with bell-crank rockers.

(D) Those with centrally pivoted levers.

From the above it will be seen that there are quite a large number of different ways of arranging timing gear on the comparatively simple four-stroke single-cylinder engine.

It is interesting to divide the best-known makes in the different groups mentioned in the first list.

In Group 1 we have the 3½ h.p. J.A.P., the 5-6 h.p. Excelsior, and the 3½ h.p. Premier.

Group 2.—4 h.p. Triumph, 3½ h.p. Rudge, 4¼ h.p. Star, 3½ h.p. Blumfield, 3½ h.p. Brown, 3½ h.p. Blackburne, 3½ h.p. T.D.C., 2½ h.p. O.K., and most of the American singles, including Indian, Harley-Davidson, Excelsi Miami, and Emblem.

Group 3.—3½ h.p. Ariel, 1912-14 3½ h Premier, 3½ h.p. B.S.A., 4¼ h.p. Jam 3½ h.p. Norton, 2¾ h.p. Orbit, 3½ h Alldays, 3½ h.p. Bradbury, 3½ h.p. and M., 3½ h.p. Humber, 2½ h.p. Calc 3½ h.p. New Hudson, 2¾ h.p. Villie 3½ h.p. L.M.C., and 3½ h.p. Rover.

Group 4.—3½ h.p. Triumph, 3½ h Sarolea, and 3½ h.p. Abingdon.

Group 5.—3½ h.p. Quadrant and 4 h M.M. (American).

Group 6.—2¾ h.p. Diamond, ? h Puch, and 2¼ h.p. Precision.

Group 7.—2 h.p. Motosacoche.

In the second list of groups s dividing the different methods of us rocker levers between the cam and tappet rods, the makes are rearrang as follow:

Group A.—1912-14 h.p. Premier, 3½ h Humber, 3½ h.p. Qu rant, and the Puch.

Group B.—(*a*) 4¼ h James, 3½ h.p. Allda 3½ h.p. Sunbeam, 3½ h L.M.C., 3½ h.p. Orb and 3½ h.p. Norton. (4 h.p. Triumph, 3½ h Blumfield, 4 h.p. St 5-6 h.p. Excelsior, a 3½ h.p. J.A.P. (*c*) 3½ h Ariel.

Group C.—3½ h. Triumph, 4 h.p. Bradbury, 3½ h Abingdon, 3½ h.p. Sarolea, 3½ h. B.S.A., and 3½ h.p. New Hudson.

Group D.—3½ h.p. Rudge (exhau valve only).

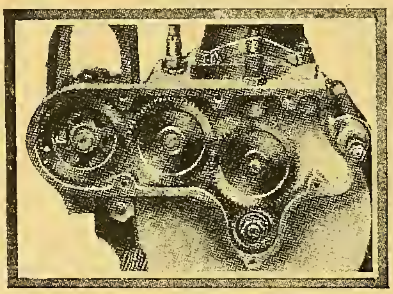


Fig. 5.—A design embodying cam wheel and camshaft. The Quadrant.

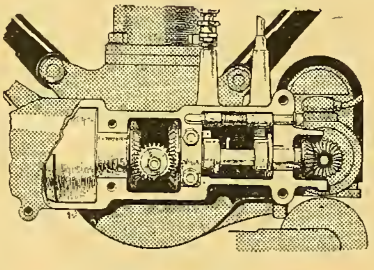


Fig. 6.—The Diamond, with cams on a bevel-driven shaft.

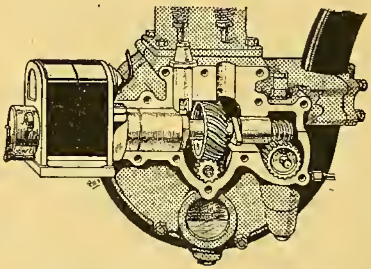


Fig. 7.—The Continental made Puch, with worm-driven camshaft.

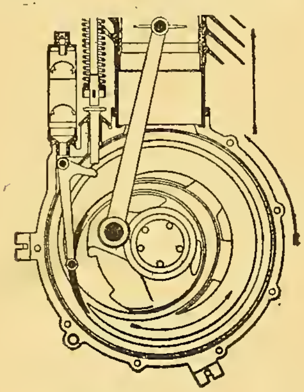


Fig. 8.—A unique valve mechanism. The single-cylinder Motosacoche

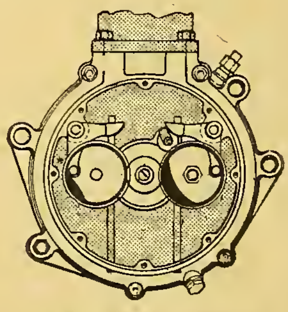


Fig 9.—The Abingdon design with internally cut cams

ONE-LEGGED MOTOR CYCLIST

WINS CHAMPIONSHIP ON

B·S·A

MOTOR BICYCLE

Christchurch, N.Z., Red Cross Motor Cycle Carnival,
23rd February, 1918.

Event 1.—LIGHTWEIGHT HANDICAP:

B.S.A. FIRST and SECOND

(WOODMAN, the one-legged motor cyclist) (KARTON)

Event 4.—MIDDLEWEIGHT CHAMPIONSHIP:

B.S.A. FIRST and SECOND

(WOODMAN) (KARTON)

Event 9.—OPEN HANDICAP:

B.S.A. FIRST and SECOND

(BONNINGTON) (WOODMAN)

In this event, B.S.A. 4½ h.p. competed against 7 h.p. machines.

RELAY RACE:

WOODMAN on a B.S.A. won the Race for his Team by beating his rival by over 600 yards.

CONSOLATION EVENT:

B.S.A. FIRST and THIRD

THE BIRMINGHAM SMALL ARMS COMPANY, LTD.,
Small Heath, Birmingham.

The accessibility of the Post-War CLYNO

Pre-war it was famed for its "get-at-able-ness." Post-war these features will emphasize that fame—

CYLINDER HEADS AND VALVES DETACHED IN A FEW MINUTES—
BACK AND FRONT CHAINS ADJUSTED IN TWO MINUTES—
ANY ONE OF THE CLYNO INTERCHANGEABLE WHEELS DETACHED AND REPLACED BY SPARE IN ONE MINUTE.
MAGNETO DRIVE—GEAR BOX CONTROL—TAPPETS—ADJUSTABLE WITH THE GREATEST EASE.
SIDECAR DETACHED IN A FEW MINUTES.

And all this will make for your greater pleasure, comfort, and convenience!

Your agent is booking after War deliveries in rotational order NOW.

Ask him about it and u
for latest folder describin
the 8 h.p. Clyno.

THE CLYN
Engineering Co.
PELHAM STREE
WOLVERHAMPTO

iming Mechanism.—

In all these different engines the aims f the designers have been to secure the ame ends—*i.e.*, to open the valves of eir engines as quickly as possible. Another aim should be to secure comparative silence in the mechanism employed, but this is a point where few designers have secured complete success, as many motor cycles are notoriously noisy, and in the majority of cases the timing gear and valve mechanism generally are the greatest offenders in this respect.

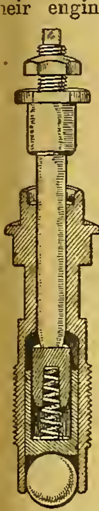


Fig. 10.—A ball-ended tappet guide with which cam rockers are not used.

The employment of a single cam to operate both inlet and exhaust valves apparently has the advantage of simplicity. In fig. we illustrate the J.A.P. design, which, t will be noted, is extremely simple. As s known to almost every motor cyclist, he lift required is not exactly the ame on both valves—the exhaust valve emaining open a little longer than the nlet valve. This difference in the ength of the lift is obtained by the hape of the rockers.

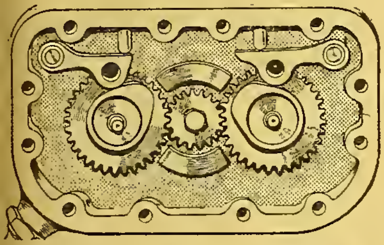


Fig. 11.—The Sunbeam engine showing opposed rockers.

This type of valve mechanism is further implified if both rockers are worked rom one shaft, as in the case of the 915-16 Premier shown in fig. 2. In this esign, it will be noted, the half-time wheel is not directly over the mainshaft inion, as in the J.A.P. design, but is laced to the side of it, and forms one f the train of gears for the magneto.

An engine with a single cam wheel having two cams side by side probably is quite as simple to manufacture as the types referred to above, as in this case, illustrated in the Blumfield engine (fig. 3), the simpler design of the rockers compensates for the work in forming the extra cam.

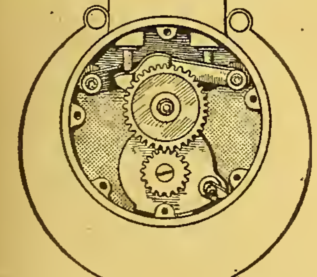


Fig. 12.—The Triumph "4," with crossed rockers.

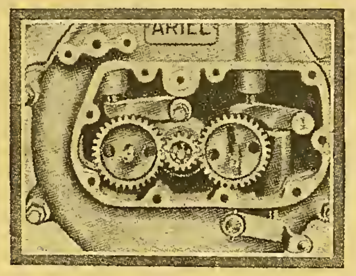


Fig. 13.—The Ariel engine, with "tandem" rockers. Note exhaust lifter lever below timing case.

The single cam wheel per cylinder is almost general practice on V twin engines, and, since it is so satisfactory, one is constrained to wonder why so many makers introduce another half-time wheel. Probably this is due to the fact that with a single cam or two cams on one half-time wheel it is impossible to re-arrange the timing of the inlet and exhaust valves independently—that is, if the timing is altered in any way, both valves are affected in like ratio. If the inlet valve is made to open earlier, then the exhaust valve opens earlier also, but with independent gears for each valve one may be changed without interfering with the other.

Single-cylinder engines with two cam wheels are more numerous in this country than any other type, and we illustrate here several examples.

Unorthodox Timing Gears.

The remaining types more or less are unconventional. For example, the Rudge engine (fig. 4) has two cams on one wheel, which is the last of a train of four forming the magneto drive. In the Villiers engine, the first and third in a train of five wheels are utilised.

There are several engines employing both a cam wheel and a camshaft. The Quadrant (fig. 5) is an example of this practice, the necessity for which is brought about by the unusual location of the inlet valve to the rear of the cylinder. The M.M. (American) engine has similar valve mechanism, the inlet valve in this case being actuated by a cam on a wheel, and the exhaust by a cam on a shaft that extends across the forward end of the crank case.

Then there are designs embodying a camshaft similar to that which is orthodox in car engines. The Diamond (fig. 6) is one of the few British examples of this practice, while the Puch (fig. 7) is a Continental design on the same lines.

There are several engines with what can be described as "freak" valve mechanism, but so few are known to be efficient that they cannot be regarded as anything more than experiments. There is one design, however, which, fitted to a small engine of well-known make, is so unconventional that it can be placed under this heading. This is the 2 h.p. Motosacoche engine (fig. 8), in which neither cam wheels nor camshafts are employed. It will be noted from the illustration that a double elliptical groove is cut in the face of the flywheel, in which runs a curved metal strip secured at the end of a long rocking bell-crank. This actuates the exhaust valve tappet, the inlet valve being of the automatic type.

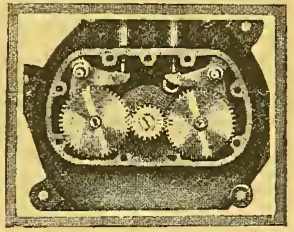


Fig. 14.—B.S.A. timing gear, using bell crank rockers.

External and Internal Cams.

Reverting to the conventional engine designs, there are two kinds of cams: the external and the internal. The external is the most popular with engine designers, but a few engines embody the internal type, among which we have mentioned the 3½ h.p. Triumph, Abingdon, and Sarolea. We illustrate this form of cam, as applied to motor cycle engines, in fig. 9.

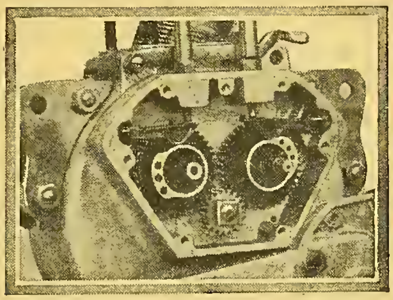


Fig. 15.—The Norton timing gear, illustrating the neat exterior exhaust valve lifter.

We have now come to the question of the different types of rockers in use, but here we can only deal broadly with the subject, as probably it is true that no two engines are alike in this respect. Previously we have divided the types into three groups, and one of these groups into four smaller groups.

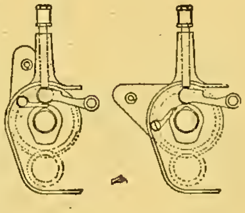


Fig. 16.—The P. and M. decompressor cam.

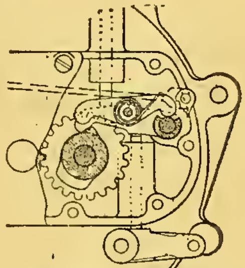


Fig. 17.—The Ariel decompressor mechanism.

Timing Mechanism.—

Under this heading it is permissible to refer to those designs which have no rockers between the cam face and the tappet rod. At first sight it would appear that the designer who eliminates the rockers has succeeded in considerably simplifying his design; but when the means employed to substitute the rockers are examined, it is admitted that there has been little, if any, saving in the cost of manufacture. Fig. 10 shows in detail a section of a tappet guide with the extra parts necessary to transmit the cam action to the tappet rod. A design such as this cannot be made so quiet in action as one embodying a rocker. The action in the former case may be likened to a train of loosely connected railway trucks being shunted as compared with the smoother effect produced with a passenger train in which all components are caused to move together. There are so many points of contact.

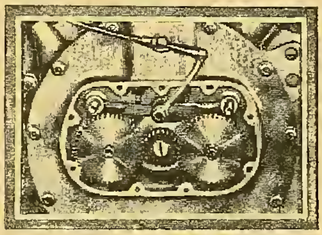


Fig. 18.—The Bradbury design, showing the neat exhaust valve lifter.

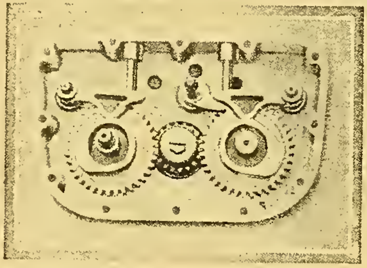


Fig. 19.—Rover timing gear, showing exhaust lifter mechanism.

In some designs, approximately straight rockers are interposed between the cam and the tappet rod; others are more complicated. There are several ways of arranging these rockers, which may be termed (*a*) opposed, as in the Sunbeam, fig. 11; (*b*) crossed, as in the Triumph, fig. 12; and (*c*) in tandem, as in the Ariel engine, fig. 13.

In many other designs, bell crank lever rockers are used, as in the B.S.A. engine, fig. 14, which have certain advantages over the slipper type of rocker. In some designs, bell crank rockers have been embodied to secure compactness.

The slipper type of rocker is not called upon to withstand very great strains, depending, of course, upon whether it is merely a member interposed between the cam and the tappet rod as the mechanism for the inlet valve (left side) of the Sunbeam engine (fig. 11), or one which is used to increase the lift, as in the exhaust valve (right side) mechanism of the same engine.

The bell crank lever actually transmits the power, taking it from the cam at one end and giving it to the tappet rod at the other. By means of the leverage obtainable with bell cranks, the movement of the tappet rod can be made larger or smaller than the cam would give if a rocker of the pure slipper type were used. But, of course, straight rockers could be used in a similar manner, though perhaps not so conveniently.

In many of the more modern designs two other functions are demanded from the timing gear, and the timing case is made to include a decompressor cam and an exhaust lifter cam. The P. and M., Ariel, Triumph, James, Humber, Excelsior, and Star are among those embodying a decompressor, while the Triumph, 1915-16 Premier, Abingdon, Sunbeam, James, Star, Alldays, and Bradbury are among those embodying exhaust lifter mechanism in the timing case.

Usually the decompressor is a third cam on the exhaust valve, which, when desired, opens the exhaust valve slightly on the compression stroke. The P. and M. device is illustrated in fig. 16, and in fig. 17 the Ariel system is shown.

The mechanical exhaust lifter is usually an idle cam, which, when turned slightly, is made to hold up the exhaust valve rocker. This will be seen in fig. 9, while a neat outside exhaust lifter is fitted to the Norton engine, shown in fig. 15. Fig. 18 shows the exhaust lifter mechanism of the Bradbury engine, while fig. 19 illustrates the Rover device.

There are two other points worthy of mention in connection with individual designs. The shaft of the half-time gear wheel on the Excelsior single-cylinde engine is carried in ball bearings—a mos unusual and perhaps very desirabl feature. This is illustrated in fig. 21.

The other unusual feature which ha many good points to commend it is th method employed on the Calcott an a few other engines to retain th train of gears within the timing cas (fig. 20). Those readers who, in remov ing the timing cover, have inadvertentl withdrawn all the gears from their inne bushes, and so disturbed both valve an ignition timing, will appreciate this littl convenience, to which so few designe appear to have given consideration.

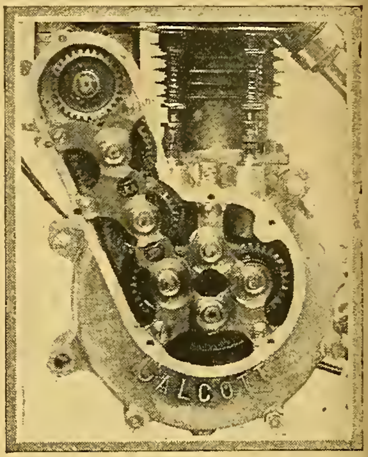


Fig. 20.—The Calcott timing gear, with means for retaining the train of gears when the cover is removed.

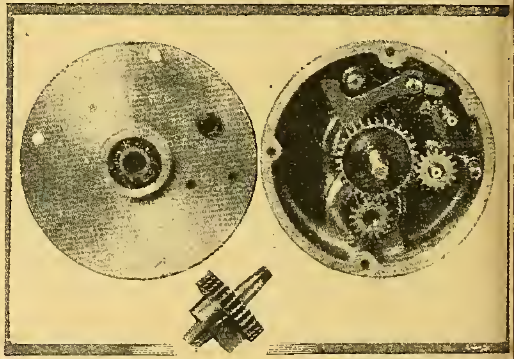


Fig. 21.—The Excelsior timing case and cover, showing the ball bearing in the latter for the half-time wheel.

* * *

Red Cross Motor Carnival at Christchurch, N.Z.

THE 1918 Red Cross motor carnival was held at Christchurch, New Zealand, on February 23rd, in aid of the local Red Cross funds. Large crowds attended, and the meeting was a success.

AUSTRALASIAN HEAVYWEIGHT CHAMPIONSHIP, FIFTEEN MILES.—For machines over 600 c.c.

S. Coleman (7 Indian) 1
H. R. Crawley (7 Harley-Davidson) 2
L. Maugham (7 Harley-Davidson) 3

These were the only starters. Time, 13m. 50s.—an Australasian record.

TEAM RELAY RACE, NORTH *v.* SOUTH ISLAND, FIFTEEN MILES.

South Island team:
Howarth (2¾ Douglas), Woodman (4¼ B.S.A.), and Crawley (7 Harley-Davidson) ... 1
North Island team:
Sweney (2¾ Douglas), Dawber (3½ Indian) and Coleman (7 Indian) 2

Time, 15m. 55⅕s.

OPEN HANDICAP, EIGHT MILES.—Ope to machines which could do 45 m.p. or better.

C. Bonnington (4¼ B.S.A.), 90s. start 1
A. Woodman (4¼ B.S.A.), 30s. start 2
H. R. Crawley (7 Harley-Davidson), 20s. start ... 3

Time, 8m. 55⅗s. There were five othe starters.

The track was an ordinary racecourse and not banked.

The Trend towards Mechanical Luxury.

Has the Evolution of the Motor Cycle progressed as it might have done?

IT is of more than passing interest to note how the perfecting of the motor cycle is following along lines similar to those which led to the evolution of the modern car.

The original single-cylinder De Dion car enjoyed a great share of popularity and gave rise to many other makes following the same principles. These in turn gave way before the two-cylinder class, which was again superseded by the four-cylinder type. Before the outbreak of war six and even eight-cylinder engines were being tried, and it is hard to say just how far matters would have progressed had "Willy" refrained from studying the map. It was very evident in those days, however, that car manufacture was branching into two distinct paths: the perfected four-cylinder, with all necessary refinements for the owner-driver, but designed with a view to reliability, long service, and easy manipulation, and the elaborate four or six-cylinder types embodying every luxury the mind could dictate, where comfort and splendour were paramount, mechanically and otherwise.

Transmission and Tyres.

In the field of transmission the chain was ousted by the cardan shaft drive, and three-speed gears were likewise supplanted by four ratio gear boxes. The necessary machinery was invented to enable mathematically correct gear wheels to be produced with marvellous precision, thus reducing noise and wear of the wheels when in operation. No car worthy of the name remained unequipped with either detachable wheels or removable rims, and earlier models were brought into line by means of the Stepney rim and similar fitments. To have to repair a puncture on the road was a very unfortunate *contretemps*, and a rightful occasion for much bemoaning of luck, whilst engine troubles appeared to have become as dead as the dodo, and tuning an art known only to and cultivated by certain prominent engineers or sporting young men who adorned Brooklands and other speed centres. *Apropos* of this, a car-driver friend of mine boasts of having driven a hundred thousand miles without even removing a tyre—his spare wheel and the talent of the local garage have solved his puncture worries—and only this summer he travelled over fifty miles with an annoying misfire on one cylinder, which proved to be caused by an oily sparking plug, and was cured by means of a rag and some petrol inside a few seconds.

"The Long, Long Trail."

There is a "long, long trail" to face before the motor cycle arrives at such a state of perfection that it can equal the car in reliability and convenience—and possibly some of us, who delight in tinkering with special jets and freak timing, fondly hope it never may—but the signs are not wanting that the hoe has been started on the furrow, and, however long and difficult the task may be, the evolution of the perfect machine will become an accomplished fact.

"Dreams and Realities."

One has only to recall the incessant outcry against the single-cylinder, the even more recent disparaging remarks anent the V twin, and the carefully worded advocation of the flat twin, to realise how uncertain the outlook really is. Belt drive is waning in popularity, and must eventually succumb before the universal adoption of the chain or shaft. Single lever automatic carburetters are quietly trying their strength before an open challenge is issued to the two-lever semi-automatic type, and even our tried and trusted friend, the magneto, seems destined to become mixed up in the fray to evolve later in a form known at present only to the gods.

Prejudice may hold back some of these improvements for a time, for motor cyclists as a class are more mechanically inclined than the car drivers of the corresponding pre-perfection period, and consequently may hold the opinion that improvement sometimes spells deterioration—therefore "well" is better left alone. Facts, however, are the best antidote for prejudice, and when some of the little bird whispers we have all heard at times materialise, and the spring frame, three or four-speed shaft-driven, four-cylinder motor cycle graces the road, one's nerves will vibrate with all the old-time enthusiasm, and prejudice will fly to the winds.

Waiting for the Perfect Motor Cycle.

The factories may resound with the hum of the shell lathes, but deep down in the brain of the man in charge may lie a little mental picture of the perfect motor cycle we are all pressing for, only waiting the lifting of the "control" and the release of the plant and materials for a chance to spring into being. It would be a bold man, however, who would attempt at the present moment to dictate the specifications of the Triumph, Sunbeam, Norton, or A.J.S.—to name only a few—for the third year following the signing of peace, but the most simple-minded amongst us can safely say it will not be the pre-war model.

FRANCIS E. SCHOFIELD.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

May 23rd	... ...	9.23 p.m.
,, 25th	... ...	9.26 ,,
,, 27th	... ...	9.29 ,,
,, 29th	... ...	9.31 ,,

Change of Address.

The Petroleum Executive has removed from 8, Northumberland Avenue, to 12, Berkeley Street, W.1—to be nearer the Controller at No. 19, perhaps.

The Late Mr. James Gordon Bennett.

Mr. James Gordon Bennett, the American newspaper millionaire, whose name is associated with the classic motor race for the "Gordon Bennett cup," died in France on the 13th inst. Mr. Bennett was in his seventy-seventh year, and with his death passes one of the strongest of characters and a unique sportsman. He encouraged motor racing by the institution of the Gordon Bennett cup, he introduced polo into America, revived coaching in France, and owned a yacht, which was aptly named *Lysistrata*. This magnificently appointed vessel violated all the rules of yacht design. It resembled a tramp steamer more than a luxurious pleasure vessel, and was perhaps the key for the world at large to judge his character. Mr. Bennett owned, among other papers, the *New York Herald*, and it was he who sent Mr. H. M. Stanley to Central Africa in search of Livingstone. In 1914 he married the Baroness George de Reuter, widow of the second son of the founder of Reuter's News Agency.

Petrol Licences Issued.

The number of licences issued by the Petrol Control Department to each class of user of motor spirit up to 4th May is shown in the following table:

	3rd issue.	4th issue.	5th issue.
Private cars	70,452	59,620	13,001
Private cycles	34,462	29,152	16,005
Doctors' cars	10,698	11,701	
Hackney vehicles ..	16,351	15,291	
Commercial vehicles	38,880	31,772	
Industrial processes	60,104	57,438	
	230,947	207,974	29,006

We published the figures for the first four issues in *The Motor Cycle* of March 21st. The figures of the third and fourth issues above are different from those previously published, but no explanation of the discrepancy is given in the *Board of Trade Journal*, from which we take the information.

Progress of Licence Issues.

The first issue of licences to "private cycles" was 95,098; the last is 16,005!

Special Features.

VALVE MECHANISM.

A NEW 500 c.c. TWO-STROKE.

SIDECAR DESIGN.

The Holiday.

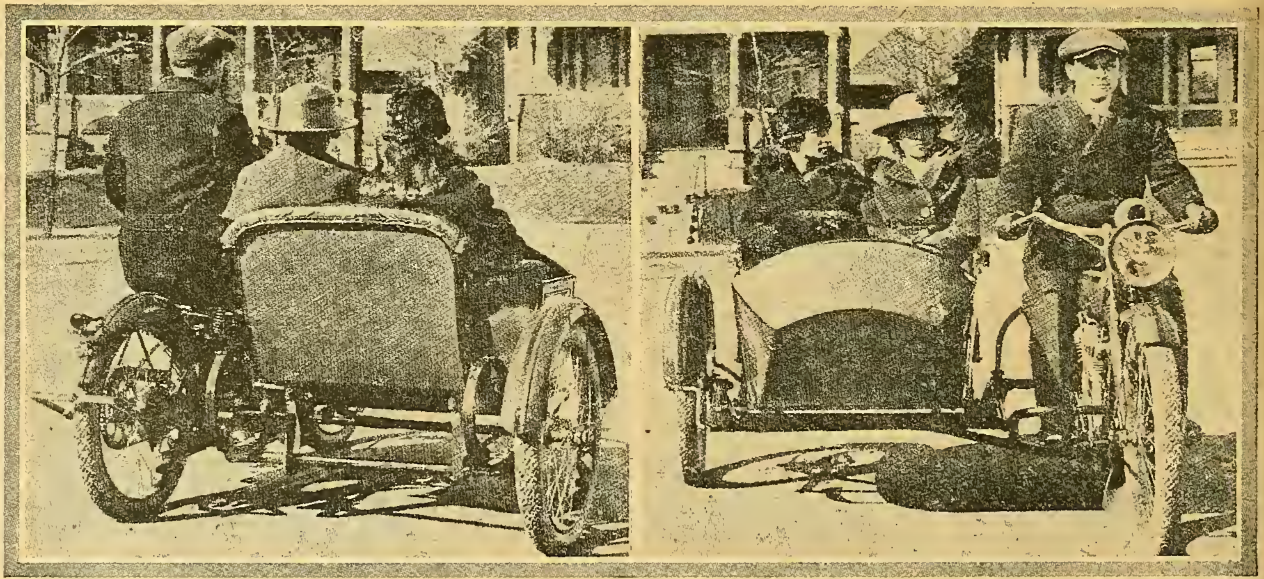
What a Whitsun! How many of ou readers must have made this comment a they looked longingly at the shinin highway? Hardly a motor cycle was t be seen, however, and a member of ou staff who lives near a country inn that i ordinary times is the resort of literall thousands of motorists on a Bank Holida saw one motor cycle and two cars.

The Pedal Cycle.

No one can deny that the war ha been a good thing for the push cycle Monday was almost like a pre-moto Bank Holiday. Thousands of pus cycles were on the roads.

Cruelty to Animals.

Why does not some daily that spend much time and money in conducting a anti-motoring campaign devote an occasional column to the cruel overloading o horses that goes on at holiday times? I is a common sight to see one horse tugging a load of ten passengers some twent miles or more.



Two views of the new two-seater Harley-Davidson sidecar. Such practice is not new by any means in England, though it has not "caught on" to much extent. Just previous to the war, however, it seemed as though the idea might become more popular, as several sidecars of this type were seen about.

oad Transport.

Under the new Defence of the Realm egulation the Board of Trade is to re-rganise road transport, and will be able o restrict the use of horses and vehicles, ake possession of them, or require them o be placed at the disposal of any speci-ed person.

New Two-stroke.

A vertical two-stroke with two cylin-ers having a common combustion space ay be tried as a lightweight engine fter the war. In this design, the pistons ork in unison, and the transfer and xhaust ports are in different cylinders, he new gas having to travel up the one ylinder and down the other before it an escape *viâ* the exhaust port. An ngine on these lines is fitted in the well-nown Valveless car, which is, by far, the ost successful two-stroke car that has een placed on the market.

he Auto-wheel in France.

An American, who is a member of the ed Cross, uses a Smith motor wheel, hich is the American Auto-wheel, in rance in the execution of his duty. hortly after the restriction forbidding he use of private motor vehicles in that ountry he had occasion to make a long ourney, and not having any authorisation o use his motor at the time decided to risk t. On one occasion he was stopped by a rench soldier, who said to him: "I must old up all automobiles, but I have no rders to catch insects; besides, I have o net, anyway." He has found the ttachment to be of extreme value in iew of the scarcity of fuel in France uring the last few months.

Motor Cycle Recruits Wanted.

The 1st Battalion County of London Volunteer Regt. has vacancies for recruits owning motor cycles and sidecars. Particulars can be obtained from the Recruiting Officer, 231, Oxford Street, London, W.1, between the hours of noon and 8 p.m. The headquarters of the regiment are the Imperial College Union, Albert Hall, South Kensington, London, W.8. Hours of attendance are Mondays and Wednesdays, 7 to 9 p.m.

A Malicious Prosecution.

We recently received a letter from a young reader, a schoolboy in the West Country, who, during his holidays hired a motor cycle and sidecar for the purpose of attending a sale and calling upon various of his father's clients in the surrounding district. His father is in the furniture business, and, owing to shortage of staff, his mother is at present acting as buyer, and she was taken by him as passenger. While in the pursuance of business he was stopped by a policeman, who, having seen the usual licences, pointed out that there was a station two and a half miles distant from the place of call, and although he agreed that the train service was most awkward, he, nevertheless, issued a summons for the illegal use of motor spirit.

Acting on our advice, the young defendant immediately took steps to become a member of the Auto Cycle Union, and by placing the facts of the case before them he was able to get their legal department to get him represented by a solicitor, free of charge, with the satisfactory result that when the case came up to be heard it was dismissed.

The Latest Idea in Pistons.

A piston in which the skirt has an expanding ring was mentioned to us recently. It is claimed that the conventional piston ring is eliminated.

The "Win-the-war" Spirit.

"See that a win-the-war spirit gets into your business letters" is the slogan of a movement just launched by the Department of Commerce in America.

A Long Stroke Two-stroke.

A twin-cylinder two-stroke with cylinders 60 × 100 mm. bore and stroke respectively, and embodying a sleeve valve, is in its experimental stage. It is intended for sidecar work.

Motor Cycle Racing.

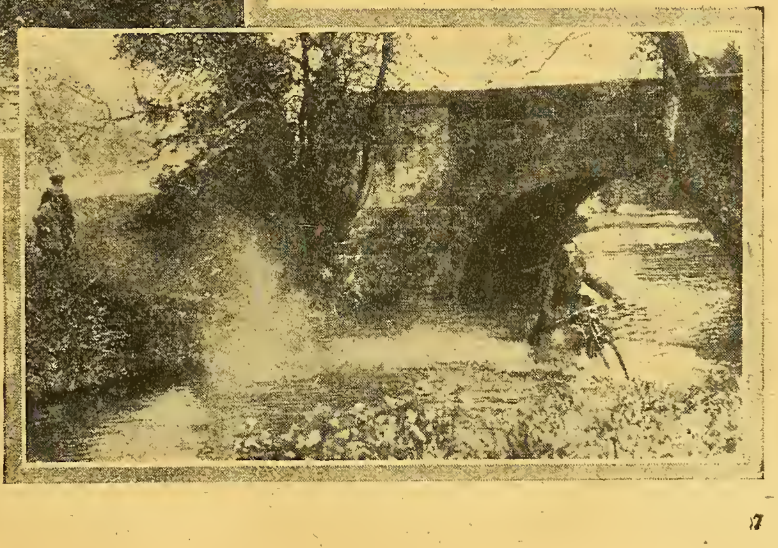
It is strange that a nation of sportsmen such as the British has not given greater attention to motor cycle racing as a sport. In pre-war days tens of thousands of men visited football matches every Saturday. Would not motor cycle track races prove an attraction and a financial success?

The 4 h.p. and Sidecar.

It was interesting to hear the opinions of a few men very closely connected with the motor cycle industry on the question of their mount after the war. Although admirers of the four-cylinder shaft-drive, three out of the four were unanimous in their choice of the 4 h.p. single-cylinder. The other man's vote was for a powerful V type twin. It would seem that, in spite of the attention being given to big and powerful sidecar outfits, the 3½-4 h.p. single-cylinder will not easily be displaced.

"Storing" Motor Cycles.

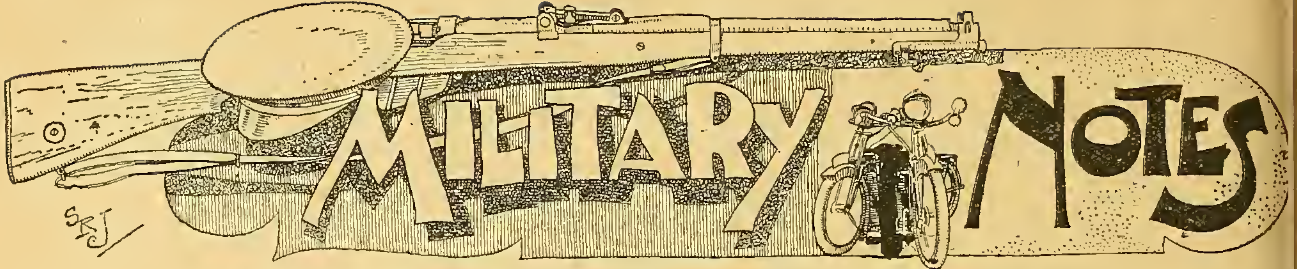
To those men who are in a position to look after their motor cycles, we would give a note of warning. Quite recently we passed through a private garage, in which there were stored at least a dozen motor cycles. The state of the machines generally was appalling, only three or four being in a clean condition; the rest were covered with mud and oil, and in a bad condition generally. One or two of these machines were owned by men serving Overseas, but in the other cases it was simply carelessness.



A Triumph tester on a stunt. It is not an ordinary negotiation of a watersplash, but a demonstration of the waterproof qualities of the M-L magneto, which stood the test without a misfire.

The Double-seated Sidecar.

We hear from America that the Harley-Davidson factory is now turning out a special sidecar provided with a body carrying passengers side by side. The new double sidecar is to be made to order only. The sidecar seat is 30in. wide inside, so there should be enough room for two people.



Addressing Letters. Four-cylinder Motor Cycles. Promotions.

LETTERS AND PARCELS FOR THE TROOPS.

TO avoid confusion by the use of initial letters only to represent the title of the force with which the addressee is serving, the public are strongly advised to write the titles of the expeditionary forces in full when despatching letters and parcels.

* * *

DISCHARGED SOLDIER WANTED AS SERGEANT-MAJOR.

THE strength of the Central Group of the Middlesex Motor Volunteers is still minus a sergeant-major. Such a position requires a man who, besides being fully experienced in all that pertains to soldiering, possesses a good general knowledge of motor vehicles. If any of our readers know of a discharged soldier possessing these qualifications, will they ask him to communicate with the C.O., 19, Queen's Parade, Muswell Hill, London, N.W.I?

* * *

LEAVE AND PETROL.

WE have received an interesting letter from Dvr. Reginald Samson, who before the war was for some time managing director of Reg. Samson, Ltd., Islington Row, Birmingham, and well known in motor cycling circles in the Midlands as a competition rider.

He makes some very caustic remarks on the Petrol Control Committee. He says: "I have been home in England for my first leave in just over three years, and, although the owner of a motor cycle, and having some petrol at my command, I could not get the necessary permit from the Committee. The time being short, I gave up the matter. I called on the Ministry of Munitions in Birmingham, but they could not do anything.

"The food question did not affect me much; I got plenty.

"Generally speaking, I am not favourably impressed with the England of to-day, and am glad to be back again in the Balkans. I told my friends to expect me back in England in 1921. I expect I shall not be far out when the time comes, and then probably only on leave.

"The last eighteen months or so I have been driving a heavy lorry in Salonica, but have now moved up on the Serbian front. It might be of interest to you to know that my present O.C. is Capt. Chater-Lea. I am now miles away from civilisation, and the country is most hilly and desolate. It is a land of mountains, rocks, and ravines. The motor cyclist is more or less a *rara avis*, as, once the telephone wire is down, there is not much for him to do; but light Ford lorries are as abundant as mosquitoes."

WITH THE INLAND WATER TRANSPORT. A CHEERFUL NOTE.

SAPPER THOMPSON, I.W.T., R.E., writing from Mesopotamia, says: "It is just grand to be able to get the 'Blue 'Un' out here fairly regularly. We are rather away from the old game now, inasmuch as we are floating about on the river instead of the land. It will be a case of port your helm, or hard to starboard for us in future instead of the old road terms. It is surprising how we the little Douglas stands the gruelling gets out here and in *such* heat. Th roads here put whiskers on a fellow; suc a lot of second gear work necessary. Nev mind; when all is over we will be on more in our element with a decent roa on which to have a little 'blind.' I a sorry to hear what a trouble it is to g petrol at home. Here we live almost o the top of an oilfield, so we have it wit our meals so to speak.

Sapper Thompson, of the Inland Water Transport in Mesopotámia, aboard the launch "Amara."

Sappers Thompson and Cummings in Arab dress. In the background on the right is a mud church. Thompson tersely describes it as "some" church.

"Rather pleased to see the intere taken in four-cylinder motor bicycles i your last few issues. Undoubtedly th is *the* touring mount. I am for Henderson after the war, *but not* wit the twist grip. I hope I have offende no one by running the American control down.

"Good luck to the best all-round pape for the motor cyclist. I do not mind you attitude *against* German goods one bit Oh! that other poor fellow. He *will* mis his paper, won't he? But he will buy a odd copy or two when no one is looking

"Keep smiling in dear, old Blighty We will soon *all* be back, and then——

* * *

EXCHANGE OF PRISONERS.

WE understand that the Governmen is considering what steps can b taken to effect a wider exchange o British and German prisoners. Negotiations have not yet been opened, and it i not known whether Germany woul agree to any proposals.

* * *

A MOMENTOUS DATE.

A REPORT from The Hague says tha the date fixed by the Germans fo the occupation of Calais was unti recently Whit-Sunday. We have n information as to whether another dat has yet been fixed.

* * *

MOTOR CYCLISTS PROMOTED

WE notice in a recent *Gazette* tha Temporary Capt. J. Chater-Lea jun., A.S.C., has been promoted t the rank of Temporary Major, and tha Temporary Capt. S. W. Carty, M.C. A.S.C., has also been promoted to th rank of Temporary Major.

J. Chater-Lea, of course, is wel known to our readers as the son of Mr Chater-Lea, the manufacturer of moto cycles and sidecars, motor cycle component parts, engines, and cycle cars Chater-Lea, jun., took part in numerou important competitions.

S. W. Carty is best known to ou readers as secretary of the Mersey Moto Club and a member of the A.C.U committee.

THE MOTOR CYCLE

AVIATION SECTION

The enormous importance of the Air Service needs no emphasis; it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National Service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouragement of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

Bombs.

In April, British airmen on the estern Front dropped 23,900 bombs on e Huns.

◇

An American Airman's "Bag."

An American airman named Beyer has ougbt down on the Western Front ven Hun planes, two of them in e day.

◇

First Government Mail.

Gustave Hamel carried the first bag of O. letters by aeroplane from Hendon to indsor in 1911. He covered the nine-en miles in thirteen minutes.

◇

Larger Gothas.

A recent official *communiqué* says that a large enemy aeroplane" has been ought down. It has been known for me time that the Germans have lately oduced some big machines, including a tha, to carry a considerably larger load an the ordinary Gotha.

It has four 260 h.p. engines, with two opellers in front and two behind. Its dth is about 130ft., and it has a crew five. The ordinary Gotha has two 0 h.p. engines, with two propellers, a dth of about 80ft., and a crew of three. *Daily Mail.*

◇

Australian "Sang Froid."

Conspicuous bravery was displayed by Queensland officer on the Western Front st week. At dusk, a British airman as forced to descend after a fight. The achine turned over, and the pilot was able to unstrap himself. The Germans ened fire and splinters flew from the eckage, and the airman, freeing him-lf, lay down for cover. The Queens-nd officer led a stretcher party in full ew of the Germans across several ndred yards, and brought in the air-an. This bravery apparently impressed e enemy, who refrained from firing.

Aerial Posts.

An aeroplane mail service was commenced last week between Washington and New York with a stop at Philadelphia. The distance between the two cities is about 220 miles. Two airmen started simultaneously from both these cities on planes capable of carrying 600 lb. of mails.

It is not proposed to inaugurate an aerial postal service during the war between Stavanger and Aberdeen.

◇

AIRMEN MOTOR CYCLISTS

Lt. Alan Jerrard, R.A.F., who before the war was a keen motor cyclist, has been awarded the Victoria Cross. When on an offensive patrol he attacked five enemy aeroplanes, and shot one down in flames. Later he engaged single-handed nineteen Hun machines, destroying one. Lt. Jerrard had greatly distinguished himself on five previous occasions. A recent report states that he is now a prisoner of war in Austria.

Lt. Alan Jerrard, V.C., R.A.F.

Gift to Royal Air Force.

Lt.-Col. Sir A. E. Bingham, Bart., has presented an aeroplane to the R.A.F.

◇

A Single-handed Attack.

A patrolling seaplane under the command of Pilot Capt. Patterson attacked a Zeppelin over the North Sea for thirty-five minutes last week, and forced her to retreat to the German coast.

◇

A Vivid Pen Picture.

That the French pilot can lend as much *entrain* to his pen as he can to his control lever will be seen by the following description, taken from *La Guerre Aerienne*:

"The four of us mount to 3,000 metres. There, oh happiness, we find several Boches. Doubtless feeling a call to safer places, when they see us they flee. This was neither kind nor polite on their part, so we give chase to recall them to their manners, and, thanks to the speed of our avions, are able to overtake and turn them.

"I attacked a Fokker, which fled like a rabbit, but my Baby Nieuport had the wings of him. Not wishing to prolong the pleasure unduly, I drew up to within several metres, and spat the whole drum at him. A second or two later he was in flames, finished! My motor chooses this instant to fail, I lose height, and another Boche comes surging at me. I let myself slip, keeping in an impeccable straight line so as not to deviate a metre uselessly, for fear of falling on the wrong side of the lines. A moment later—why? I do not know, but what joy!—the Hun abandons the chase (perhaps he sights one of my companions), and I pass the lines lower than three hundred metres. A new fusillade, but without consequences, and I land at last. Ouf! My avion had received five bullets; as to me, nothing worse than fear, but *what* a fear!"

STUNT FLYING

PART III. By "Torque."

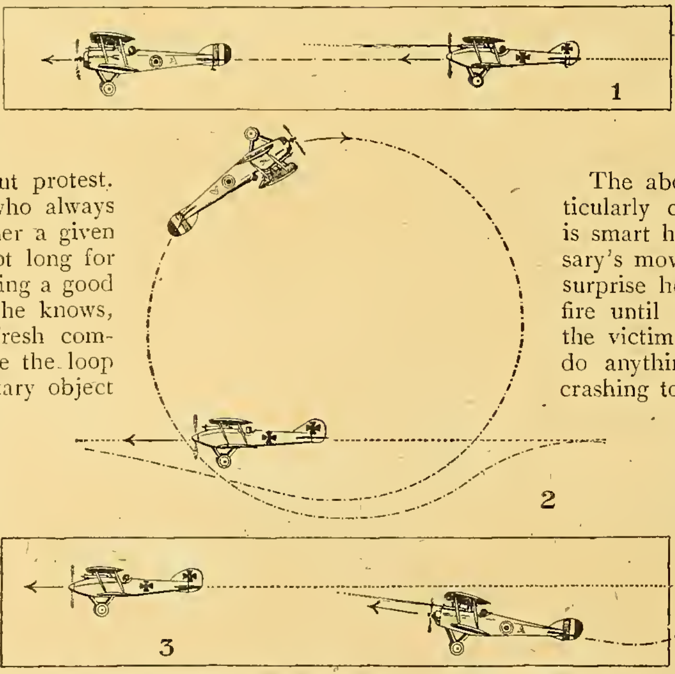
In the following article our contributor describes the "loop" and shows its tactical value in aerial warfare.

In the early days of the war, when stunt-flying was in its infancy, this article might have brought Dora hotfoot on my trail; to-day it is devoid of interest to any Service pilot. I should preface it with the explanation that I have isolated a single stunt—the "loop"—in order to give some idea to readers ignorant of aviation that stunts are of distinct offensive and defensive value in aerial fighting. In air fights, as in all warfare, the element of *surprise* is vital in tactics. If a foe of average intelligence can guess what you are going to do, and has an adequate counterstroke at his command, you had better keep quiet or resign yourself to die without protest. So in stunting, the pilot who always adopts the same stunt under a given set of circumstances, is not long for this world. In actual fighting a good pilot employs every stunt he knows, and weaves it into ever fresh combinations. I merely isolate the loop for the sake of an elementary object lesson.

Fig. 1 shows a Boche machine on the tail of a British machine. The British pilot is helpless for the moment, and will be dead in ten seconds unless he takes rapid counter measures. He has been taken by surprise. Perhaps the Boche has dived down out of a cloud. Perhaps the Britisher was dazzled by the sun, or watching anothe machine miles away, or had a splodge of lubricating oil on his glasses, or was trying to tighten an oi joint. The exact cause does not matter. We wil pretend he did not know there was a Hun scou within miles, and suddenly he has heard the tack tack of a machine gun punctuating the sustained roar of his engine, and seen a white splinter fly from some adjacent woodwork. Fritz is shooting at him and he cannot shoot back, for his own guns are rigidly fixed to the fuselage before him, and will only fire forwards. We must further suppose that Fritz is a fool, and is not expecting a loop on the part of the Britisher; actually, Fritz is no fool: he is watching like a cat, and out of his bag of tricks he will produce some dangerous counter move, whatever the British machine may do. But we will suppose that Fritz is a fool, and holds straight on.

An Actual Aerial Combat.

Fig. 2 indicates that the Britisher promptly loops the loop, and that Fritz keeps straight on. Fig. 3 shows their respective positions a few seconds later. Fritz is now in front; Fritz's guns are blanketed, because they too only fire forward; the gap between the two machines has widened a little, because the Britisher lost a little distance while he was chasing his tail; but at any rate, he is now top dog. He can use his guns if his sights line up at any moment; he occupies for the moment the commanding position.



1. A British aeroplane chased by a Hun. 2. The chased loops the loop, leaving the chaser to continue his horizontal flight. 3. The chased now becomes the chaser and can use his gun.

The above is not, of course, particularly convincing. If the Boche is smart he can follow all his adversary's movements, and in effecting a surprise he would probably hold his fire until his aim was perfect, and the victim would have no chance to do anything, because he would be crashing to earth miles below. Still, the conditions shown have actually occurred. For example, if the attacking airman has swooped down in a long dive, with his engine fully on, he cannot pull out of this dive instantaneously without subjecting his machine to a stress of many more tons than it will bear. The dive must continue while

Stunt Flying.—

the victim loops. When the loop is complete the distance between the two machines will have widened considerably, as Fritz on the dive is always very fast, and a loop is comparatively slow.

Fig. 3 would then show the machines widely separated with the Britisher on top: and an imaginable fig. 4 would depend on whether both men were equally full of fight. For example, Hun machines are generally slow climbers compared to ours, and if Fritz found himself underdog over his own lines, and without any support at hand, he would probably break off the fight: our man might hesitate to go down, with the chance of being coaxed over a nest of Archies: and the fight would be over for the time. Now that formation fighting is the rule rather than the exception, actual aerial battles practically defy analysis: and the above can only be regarded as rather an artificial object lesson.

Strategy in the Air.

The loop, however, is still a good sound stunt, because it may or may not be completed. It begins with a very steep climb: and so do several other stunts. Immelmann slaughtered many of his victims by inventing a special type of turn (described in "Flying Facts and Theories," Control III., May 9th), which began like a loop. As he climbed, creating the illusion that he was going to loop, and tempting his prey to fancy he knew Immelmann's probable position ten seconds later, the Hun would wrench his machine round just before his tail pointed vertically downward and come back at his enemy. Thus he gained height, instead of losing it: and when the manœuvre was complete, his machine and its guns pointed in exactly the opposite of that direction which a loop would have given them. This was very disconcerting, as long as it was new. In like fashion, a pilot may dip his nose slightly, and begin the fierce upward rush which looks like ending either in a loop or an Immelmann turn: but it may develop into something quite different. Instead of coming back at you in an Immelmann turn, he continues a spiral climb, and keeps above you, ready for a second dive when a chance occurs. Or, if he wishes to break off a fight, he may bank over after executing the first third of the loop, and stand his machine with a wing tip pointing vertically downwards. If he holds it long enough on this course, the machine must stall, because its planes are not designed to "lift" in this attitude. In a very few moments he will have wing-slid a thousand feet or so, and unless you have avoided the three or four false deductions which were open to you when he pretended he was going to loop, he is now far beneath you, and your guns are probably pointing in quite a different direction.

Where the Danger lies.

It is the combination of stunts which is dangerous either in attack or defence: and obviously the move which looks like one thing, or one of two things, or one of three things, and develops into something utterly different within ten seconds, supplies that element of surprise which is so vital to successful tactics.

The time factor deserves underlining. Broadly speaking, British scouts possess a better "performance" than German scouts. They can climb faster, because they are aerodynamically more efficient, and their engines are lighter in proportion to h.p. If you particularly wish to "crash" a German machine, and know you can outclimb it, it may sometimes pay to let him snatch the upper position. Provided he is given no opportunity to reach your blind spot, and shoot you down, you cut off his retreat to a certain extent by being below him. On the other hand, his machine is heavier than yours, in all probability, and will therefore dive faster. Consequently, you must be careful about letting him get altitude: for he can then dive, to attack or escape, as he may prefer, and he can outpace you on the dive. Thus you must decide whether your superiority on the climb is, at the moment, of more value than his on the dive, and having decided you must act—quickly.

* * *

WITH THE AMERICAN EXPEDITIONARY FORCE IN FRANCE.

An aviation field where Americans are schooled in combat flying before going to the fighting line.

THE EXPERIENCES OF A "HUN."

I.—Impressions of an Observer on controlling an Aeroplane for the First Time.

By "PITOT."

THE majority of pilots are trained as such from the very beginning, but nevertheless there is always a percentage of observers who have served (and survived !) their time in France, and come home for the purpose of changing their single wing for the double one.

I am lucky enough to be numbered among this happy band, and recently joined an elementary squadron, where, with many others, I mastered the intricacies of the jovial Rumpety.

The Rumpety is, indeed, a fearful and wonderful machine. No one seems to know the reason for its name, though some suggest it is derived from the "Rumpety-rumpety rump" of its song in the air. The nickname is, none the less, expressive.

A walk round the hangars on reporting to my new squadron proved a most edifying and surprising tour.

Instead of the sleek, speedy-looking machines which had hitherto graced my vision, huge and unwieldy looking monsters smote my outraged retinæ. There was no form or beauty about these leviathans as they crouched there in their hangars on squatty little under-carriages, graced with four "super-scooter" wheels. Each seemed to leer in a superior manner, as much as to infer, "Wait till I get you in *my* nacelle."

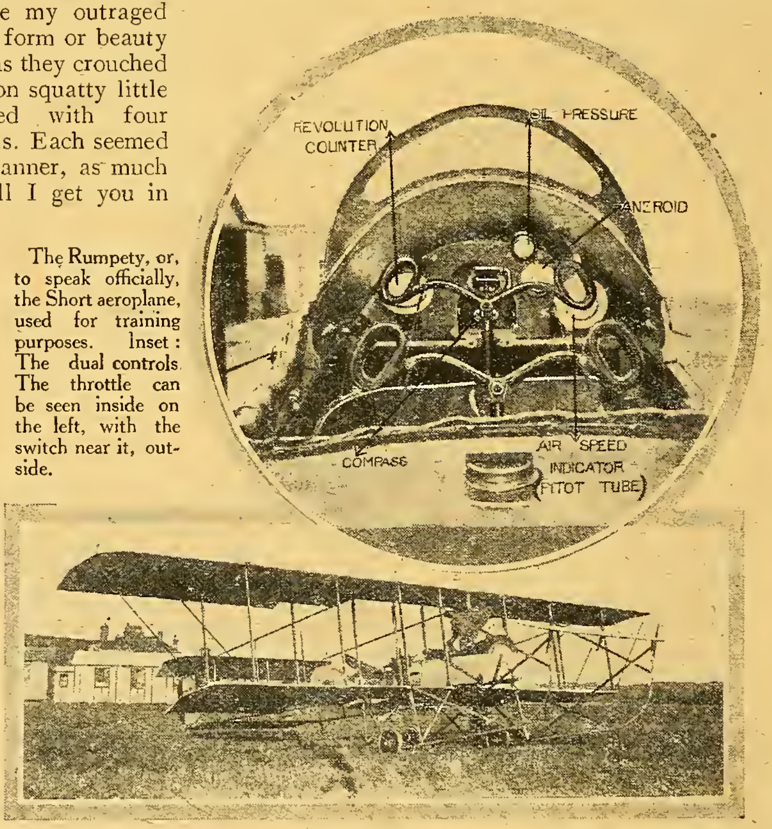
Their span was enormous, and from between the upper and lower wings projected a snout, in profile much like a rhino's head, with a totally inadequate-looking engine and propeller adorning its rear extremity.

An intricate ascent through, over, and around this very greasy jungle, rewarded the inquisitive one with a view of the intestines of the machine; the seats for instructor and pupil and the controls.

What controls!

Rearing its head in place of the usual neat "joy-stick" was a lever with two outward sprouting growths from its head, culminating in grips uncommonly like scissor handles, the whole thing strangely reminiscent of a pair of spectacles balanced on the end of a walking stick.

Moving the whole concern forwards or backwards makes the machine dive or climb.



The Rumpety, or, to speak officially, the Short aeroplane, used for training purposes. Inset: The dual controls. The throttle can be seen inside on the left, with the switch near it, outside.

Twisting the handles up and down makes it "bank" either way. Directional control of the beast is assured by two pedals strongly resembling those of a harmonium. These move the rudders—for this weird contraption possesses two!

A day or so later the clouds were chased away by a brisk breeze and flying began. The mastodons were hauled out, their engines primed and started, forthwith they lumbered majestically along the ground, and lo! they rose into the air and flew.

That is to say, if the cavortings of such colossi can be likened unto the airy grace of birds, they flew!

At length I was seated in the back seat with pilot in front and engine behind, surmounting my head a so-called "crash-hat" like unto an inverted and abbreviated drain-pipe, and around my corpulent middle a belt—"just in case," you know!

A few preparations, "contact," and the beast belched forth its roar just behind my ear. To one unaccustomed to "pushers" the noise was unpleasing.

The man at the wheel being satisfied with the "revs.," the machine began to move along the ground, so as to get into wind before taking off. One final wave of the hand, a roar from the exhaust merging into an ear-splitting crackle, a rush over the grass, and the flight was begun—the strangest I ever had.

It was "bumpy" and had begun to rain again. Round and round the aerodrome wallowed and snorted the beast at a mere "00" feet!

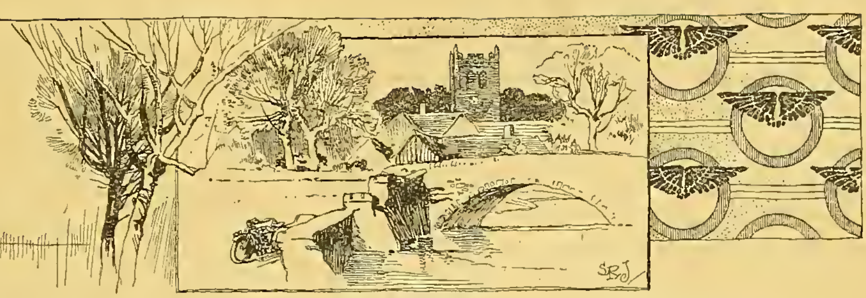
Suddenly the engine ceased its cacophony of clamour, and began to spit and splutter in sullen muffled rage. The machine set its nose for the green fields beneath and glided down, "bumping" as it glode. It flattened out, skimmed along, and landed itself gently upon the aerodrome.

With feelings of relief, not unmingled with respect, I clambered down to *terra firma.*

The machine merely leered at me.

(To be concluded.)

SIDECAR DESIGN.



Should the Sidecar be Convertible and Detachable? Suggestions for Reducing its Cost of Production if made as a Self-contained Vehicle.

As one who is interested, largely from a manufacturing viewpoint, in the future of the sidecar combination, I should like to add a few remarks to your article of May 2nd. The article in question deals with the type of engine that will be most popular in the, let us hope, near future. There are good arguments for the single, the twin, and the four-cylinder, but what I think far more important is the design of the combination as a whole.

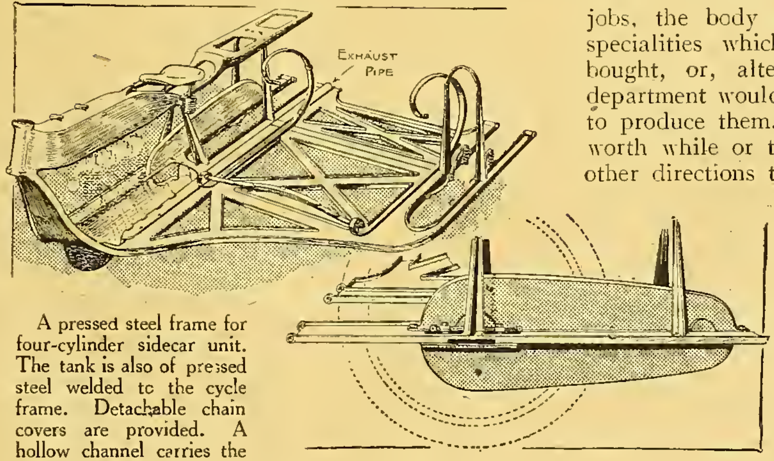
How the Sidecar Combination was Evolved.

The sidecar combination, whether single or multi-cylinder engine be employed, is an evolution. Originally introduced as an attachment, the sidecar has become in reality a fixture. No sidecar owner contemplates detaching a sidecar for convenience of storage: it is too irksome and sometimes too lengthy an operation, and when this method is adopted the sidecar is seldom in line with the cycle after one or two attachings and detachings.

I know many sidecar owners who garage three-quarters of a mile and a mile away from their homes in preference to taking off the sidecar and replacing it in the street. To all intents and purposes, therefore, the storage question is approximately the same as that of a small car.

Manufacturers recognise this, and possibly it explains the reason why so many motor cycle makers laid themselves out to design and produce sample cycle cars when the little four-wheeler was revived some years ago. They recognised that they had sold a great number of sidecars, and thought probably that the cycle car would be a serious rival, quite 50% of their sales of motor bicycles being due to the facility of attaching a passenger-carrying machine to the solo vehicle.

Time has proved that they have so far had no reason to fear competition from cycle cars. This brings me to my line of thought in connection with sidecar combinations, and I am going to ask a somewhat hoary question: Why should the sidecar be detachable? Afterwards I will explain the reasons why it has been so made up to now, and make a few suggestions for making it a self-contained vehicle in future.



A pressed steel frame for four-cylinder sidecar unit. The tank is also of pressed steel welded to the cycle frame. Detachable chain covers are provided. A hollow channel carries the exhaust to the back.

Motor Cycle Makers and the Sidecar.

We will begin with the question, Why should the sidecar be detachable? It has been so made because its introduction and manufacture were and are in the hands of specialist firms. It received its first encouragement, from a manufacturing standpoint, from firms who, previously to the sidecar, made trailers and forecarriages. It came to them originally as an adjunct to their business, something to be encouraged and exploited for their benefit as well as of advantage to motor cyclists, their wives, sisters, and sweethearts.

The motor cycle manufacturers left it severely alone, as they do almost to this day. It was not suitable for their machinery, the profits were inconsiderable, the assembling and manufacture generally occupied a lot of valuable space, and only the wheel and frame were cycle makers' jobs, the body and upholstery being specialities which would have to be bought, or, alternatively, a separate department would have to be organised to produce them. Finally, it was not worth while or they were too busy in other directions to bother with it.

The next reason why it remains an attachment is because motor bicycles are standardised, so far as individual manufacturers are concerned. It is cheaper to produce motor bicycles in quantities in an organised factory and equip them afterwards with a sidecar than it is to redesign a machine completely.

Directors and works managers dislike alterations in design. Once started on production they can go on reducing cost year by year, provided there is no fundamental alteration. Introduce a new thing altogether and the production organisation is upset.

Sidecar Design.—

This largely explains the success of the unmechanical makeshift which, despite its drawbacks, is the most economical, fastest for the power employed, and most enjoyable form of passenger motor cycle extant.

I have had a lengthy experience of cycling, motor cycling and motoring, and if the fairies were to come to me and present me with a first-class car, heaps of petrol, and free garage, I should still occasionally yearn for a good sidecar on which to go for a ride, in lieu of sitting at the wheel of a car with only the accelerator pedal to push.

This interlude is to explain that I have no quarrel with this type of motor, even when compared with the best car that money can buy.

Outline of the Suggested Three-wheeler.

Having set forth some of the reasons why, in my opinion, the sidecar has remained an attachment so long, I will now give an outline of what might be done with this type of machine to render it more of a self-contained vehicle and less of a convertible article. By adopting my suggestion in some form or other, the production of sidecar combinations would be reduced in cost and strengthened at their weakest point, viz., the method of attachment.

Reference to the sketches accompanying this article will show that the broad suggestion consists of a pressed steel frame built up of two or more parts, which would be riveted together. The part on which would be assembled the engine, gear box, tanks, etc., consists of one steel pressing, which would extend from the front to the rear of the bicycle. Riveted to this pressing, which, for want of a better name, I will term the cycle frame, would be another pressed steel section of triangular shape, on which would be placed the sidecar body, C springs, and the wheel, which could be either of the rigid or sprung variety.

There is no doubt that this design would be cheap to make, once the necessary tools were made for the pressings. These would be costly, and it would be impossible to make pressed steel sections of the shape required with one or two sets of dies. Several sets would be required. However, to make an experimental model it would be best to make the shapes wanted from ordinary sheet steel, cut, formed, and riveted at various points.

The ball steering head to carry the front fork could be welded to the frame by the electrical or oxy-acetylene process; the reinforcing flanges, thrown up at the edges for securing the necessary strength to a flat section, could be riveted or welded on; and the portions which required cutting away for the attachment of the engine, gear box, rear wheel, etc., would, in the case of an experimental model, have to be chiselled out by hand and filed up to shape.

When completed, if a trial machine proved satisfactory and the necessary dies were made to produce in quantity, imagine the saving in the cost of frame building, brazing and filing-up innumerable joints, and machining a number of intricately-shaped lugs. The bicycle part of the pressing could combine, in the process of shaping one half of a chain cover, a sort of well in which the lower half of the transmission would be made to run; if such a well presented difficulties in production for the steel presswork makers, it could be pressed separately and riveted on. The top half could also be pressed in the same way and fitted over the trough or bottom half, thus forming a completely enclosed case for the chain transmission.

The pressed frame of the bicycle portion would form an efficient mudguard and under-pan or shield dispensing with the usual mudguard and stays. The same pressing would form a firm support for the rider's feet; no separate footrests would be required. Attachments for such points as speed gear levers, oi pipes, stands, silencer pipes, magneto, etc., would be simplified, for the reason that a pressed stee section presents facilities in the way of ready attachment of such parts by riveting or bolting, whereas a tubular steel frame must have lugs designed to be built into the frame, or clips for the securing of such parts. A tubular steel frame is most unsuitable for the attachment of anything except by brazing, and every brazed joint weakens the frame; or, to express it another way, the gauge of tubing employed requires to be very much thicker to withstand so many brazings.

The Disadvantages are Two.

What are the disadvantages of such a design? Reduced to practical limits they are only two:

(1.) The sidecar is not detachable, and when the machine changes hands the sidecar must go with it.

(2.) In some cases it is easier to get at the transmission of a motor bicycle with the sidecar removed.

The first is relatively unimportant; sidecar combinations usually change hands in a complete state.

For the second, I have owned innumerable sidecar combinations, and have only once had to detach the sidecar to facilitate adjustment of the transmission, and then only for convenience sake; I could have got at all the parts without removing the sidecar. Does a car owner take off the body to get at the universal joints? Of course not; he either uses a pit or crawls underneath the chassis—either is more irksome than access to the transmission of a sidecar with the body *in situ*.

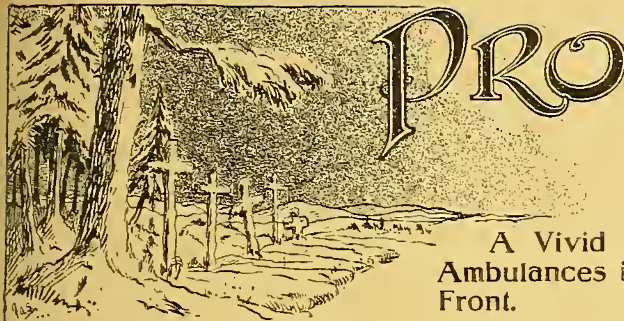
The motor bicycle frame is an evolution of the pedal bicycle; and a marvellous piece of work is the latter: I would not disparage it. It combines lightness with great strength, but when it comes to sidecar combinations I regard the pressed steel idea as cheaper, quite as strong, better for assembly of parts, greater rapidity of production, and a more mechanical and stronger method of combining the two frames without tubular stays and joints.

So far I have not touched on the question of seating. When a three-wheeler is made as a self-contained vehicle it is not surprising to hear suggestions for side-by-side seats. It is a natural desire, but as it entails springing the whole machine to provide a reasonable degree of comfort, I propose to retain the usual saddle seat and separately sprung body and wheel.

The sidecar combination must be cheaply produced, and one cannot introduce springing and hosts of complications without increasing expense, and then the purchaser turns his attention to a small car.

I suggest at least a 3in. tyre and 28in. wheels, having tried both 26in. and 28in., and found the 28in. more comfortable and better in many ways than 26in.

I now leave the idea to the tender mercies of my critics, who, I quite expect, will have some weighty arguments to bring against it. MECHANICUS.



PRO PATRIA.

A Vivid Description of Work with the Sidecar Ambulances in the Mountainous Part of the Western Front.

"IT is not cold to-night, Monsieur. You rest *couché* in the sidecar!"

The *Maréchal des Logis* is an optimist.

"*Oui, mon vieux.* And you?"

"I ascend to the dressing station. I will tell you in good time before the *blessés* arrive."

We watch his stooping figure till it disappears along the precipitous pathway, swallowed up among the shadow of the firs; then we turn to our sidecars and make all comfortable. The bitter frost has relented, and there is a touch of spring in the air. There is to be a *coup de main* to-night, somewhere along the line within a mile of where the sidecars are now stationed, and we are here in preparation to carry away the wounded. It is our third night on draught—precious little sleep for eighty hours, but the evening being young, we are not yet prepared for sleep. We wonder at our wide-awakeness—tough lads of the right type assuredly, we tell ourselves.

Nothing else presenting itself, and the ascent to the dressing station not being enticing, we wander into the nearest dug-out. It is the telephonists' quarters. There is always something doing here, and the photographs that adorn the walls—Oh, those photographs! Those who know them demand no description; those who do not know them had best remain in the blessed innocence of their untainted manhood.

The Love of Music.

The French love music—worship it, fall over each other to catch a chord of its enchantment. I have a mouth organ, a relic of days in the Yukon—far off, thank goodness!—and give them a bar or two of "A Long, Long Trail a-Winding," with bits of my own thrown in. That opens the ball. It opens also a cupboard to the left, and from it emerges a bottle of colourless liquor they call Cognac. We drink to each other and to the end of the war. How weary of it we are! Yet why? We enjoy each day, we are free, we are happy, yet it is the weakness of humanity to count upon the sweetness of days to come.

That passes. We emerge into the night once more, the plaintive strains of a southern love-song echoing in our ears. It has turned colder—the mud is crisp under our gumboots, and, as we pause at the entrance, suddenly we realise how intensely weary we are. Sleep falls upon us like the pressure of a hand: irresistible, sudden, just as wakefulness comes in the morning. I recollect creeping into my sidecar stretcher, pulling the blood-stained sheepskins over me, and, after a struggle, buttoning myself in. No matter how cold it may be, we feel at that moment that nothing can disturb our slumbers.

How different the outlook when we wake an hour later! The first weariness is slept off: we feel ourselves to be machines once more—machines that dumbly obey orders, unquestioningly, mechanically, summoning up sense to do this and that, then working in a trance till this or that is completed. Such is the weariness of long hours of sleeplessness. We get up, shivering with cold, contrive to throw a blanket over the stretcher cover to keep out the frost, and that gives us another hour's sleep. When next we wake it is to move—after a sleepy speculation as to the practicability of warming the place with a *briquette*—to seek some other shelter; the sidecar, as we knew all along, is impossible for the cold hours of dawn this time of year, and so we toil up the precipitous path, under the camouflage of the firs, towards the dressing station.

Star Shells in the Night.

What a trip! Suddenly the whole sky flickers, and lonely and high soars a star shell, lazily, beautifully lighting the desolate, snow-covered uplands, so that the fir trees on the distant ridges stand out in silhouette. There is silence everywhere. Then comes that slow but murderous "tak-tak-tak" from the Boche's lines, followed by the quick and erratic fire of our own *mitrailleuses.*

Up goes another star shell and another. In the shadow of the firs we stand and watch and listen. Something tells us that a *coup de main* has started.

Words may be adequate for describing the ordinary conditions of life, but there are noises one cannot describe. It shakes the earth, it shakes the sky, and one decides that every man along a three-mile front must have handed in his check. For an hour it lasts—bewildering in its magnitude—then silence, a silence which seems veritably to hiss in one's ears: a part of the cold and the sudden blackness.

There are some prisoners, but we are told that, so far as we are concerned, the outcome is three wounded and one killed! It is almost incredible, and we wait by our sidecars till the solemn little procession, carrying its stretcher shoulder high, comes down the hill. By the light of a flashlamp we perceive a bundle of bloodstained bandages—no matter what he might have been, *procureur*, horse slaughterer, bigamist—even if we knew it would make no difference. To-night he is an innocent son of France, with an old, white-capped mother awaiting news of him, and we raise him from the narrow stretcher into the sidecar with the touch of love and brotherhood.

"Slowly, Monsieur?" we ask the doctor. "The route is very bad."

Pro Patria.—

The doctor shrugs his shoulders. "It is not necessary, Monsieur," he answers. "He is wounded in the head, and will feel nothing. Get back quickly for the next."

And so we let in the clutch, and set off over the shell-shattered road in pitch darkness. We have strapped our man down so that he cannot fall out or kick, but ten minutes of it awakens him.

Will one ever forget those cries, tearing at one's heart strings with every jolt—"La-la-la! Name of God, O name of God! Slowly! Slowly!"

We swallow our very hearts, for it must be done. Every cry is a living coal which burns indelibly into the mind, and time does not harden one. Silence falls at length, and we thank our stars for it. Through the scented moonlit forests we go, passing trains of *ravitaillement* and cannon, finding here that the whole bank has collapsed into the roadway since midday, the merest passage having been dug aside.

The Pathos of the Little Graveyards.

We gain the valley at length—still silence. To our right is one of those soldier graveyards that dot the roadside everywhere in these parts, with their pathetic little ornamental crosses, so characteristic of the French peasant. Aloft winter still reigns—here spring has dawned. The little graveyard is aflame with daffodils, and the fragrance of the place touches one when passing. Here, within sound of the cannon, within range of the guns, indeed, is a true resting place, fragrant with flowers, in the peaceful valley they have loved, and above it stands the great white cross—*Pro Patria!*—with its sheltering arms casting their shadows over the mounds of earth.

Soon we are within the region of civilians. We pause at a *Poste de Réconfort* to drink a cup of hot coffee—then on. It is daylight now. Through picturesque little villages we go, and on every bank flowers are blooming—often amidst the grim relics war. They are not picturesque, these war-time ruin for there is too much plaster and wallpaper abo them, yet it touches a strange chord when one sees cottage garden, well tended and ablaze with bloo while the cottage itself stands shell-shattered and roc less, long since deserted by those who still, doubtles call it home. There is nothing in this lovely regi but old people and shattered homes!

A sidecar ambulance waiting for the wounded. In the mountainous region of the Western Front winter still reigned when "Chinook" wrote this article.

The peasants cast but casual glances at the sidec with its screened suffere They are too accustomed the scenes and sounds of war-passing to and fro in an u ceasing procession for thr long years now—to note ther from what is taking place b a few miles away. Old wom scurry into the gutters to avoi the splash, then go their wa without second thought glance.

We arrive at the hospita A stretcher bearer casts bac the hood and looks within wit a quiet enquiry.

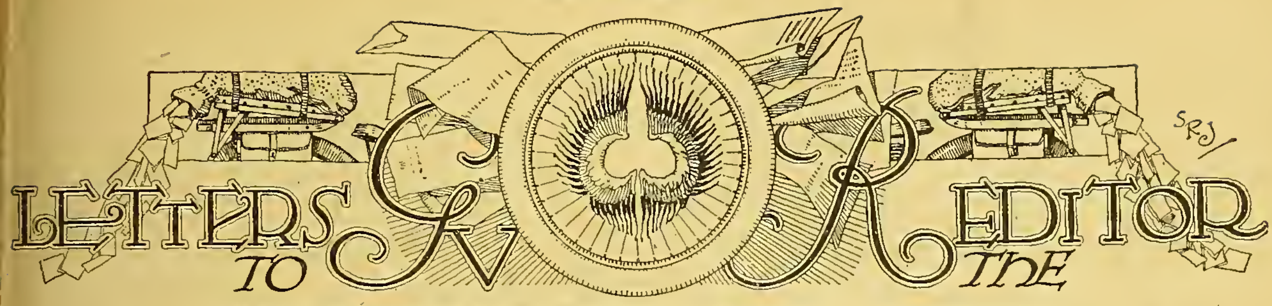
"You might have saved yo petrol, sir," says he, and w know now why our man wa silent. They lift him out, an hour ago we helped to li him in—a thousand times mo sacred now than then—and s the sidecars continue the work, generally at night-tim from the trenches to the bas They go where the cars ca not pass, or where, perhaps it is not worth while risking valuable vehicle. The suffe ing, the pity, the pathos of —fair sons of a fair land shattered in the twinklin of an eye into bloody, pitiable, moaning things—"Slowly, Name of God! O Slowly!"

Yet there is sunshine and laughter and song amids the pathos. To me there is no horror in it all. The come, they do their bidding with laughter and song and they go—go like men to rest honourably in quiet, flower-strewn place, amidst the scents an scenes they loved, within sound of the guns and th hurrying wheels of war's grim traffic. They go, mos honoured of all—*Pro Patria*. CHINOOK.

THE MOTOR CYCLE TAMER AND HIS VICTIMS.

"WE have bestridden some wild mounts in our time," writes an American journalist possessing the happy faculty of graphic description, "including the fiery Ormonde made for the Paris-Madrid race, but the wildest of the lot was Glen H. Curtiss's 10 h.p. single-geared racer.

"An unsuspecting friend of ours in New York State purchased this monster, and besought us to go out and break it in. As a precautionary measure, we lowered the gear. Even then the front pulley resembled the domestic bread trencher. There was something wrong with the primitive magneto, and to start the engine you had to cover the hundred yards in about 10⅖s. Anything less, and she refused to start, but if you were i good form you were rewarded by a premonitor rumble, which you instantly checked, making a ma leap for the saddle, and once astride, you could ope the throttle and discover a new chapter in life. You eyes streamed water, and you touched the saddl every quarter mile or so; railroad level-crossings yo never felt. Mazeppa would have appreciated her But we did not; she brought the grave too near, an we sold her to a college boy who told us he wante something 'that could hump.' He got it."



LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

WHAT HAPPENED.

Sir,—Returning from a ride I found my Triumph pulling badly. Examining the exhaust valve tappet I found the valve was being held up, and, as the tappet rod appeared to be seating correctly, I diagnosed stretched valve rod. As there was not sufficient adjustment in the adjustable tappet to get a thin card clearance (or indeed any clearance whatever) there was nothing for it but filing down the valve stem. I filed off $\frac{1}{16}$in. before I got any clearance. To my surprise, on starting up the engine, I found $\frac{1}{16}$in. clearance between the valve rod and the tappet table, and had to take it up by the adjustment. It looks as though the trouble was that the tappet rod was being held up, thus holding up the valve; but before filing the valve stem I had given the tappet rod a smart blow with a small mallet and failed to get it down to give clearance at the tappet table. The tappet rod appeared to work quite freely in the guide. What was the trouble? Will some expert diagnose it for me? AR 757.

CARBURETTER ADJUSTMENT.

Sir,—I am really very greatly obliged to your unknown correspondent who writes in your paper about my carburetters under the *nom de plume* of "Binker." I am sure his letters cannot help but be of great value to your readers.

It is very seldom, however, that we hear of a user who finds the adjustment difficult. Ninety per cent. of purchasers would endorse the letter in your issue of May 9th signed George B. Atkins.

I must, however, take exception to your correspondent "Excelsior" in the same issue.

I am quite certain that no one can fail to get the results claimed for the carburetter, provided it and the engine are in good order, and he take the trouble to understand it. In support of this, I will say that we have received more than ten thousand testimonials, and my carburetter was selected by Mr. Robbins when he entered for, and won, the much-coveted manufacturers' trophy. This most of your readers will remember as the great reliability trial.

Mr. Robbins writes me that months previous to the event he had carefully tested every other make of carburetter, and finally decided that the Binks carburetter was the one, in his opinion, that was most likely to give him success. In conclusion, may I say that I am at all times at the disposal of any of my customers who experience the slightest difficulty in getting the correct adjustment? CHAS. BINKS.

V TWINS OR FLAT TWINS?

Sir,—Recently I have read with much pleasure the letters of your correspondents praising the V or flat twin. At the same time, I was sorry to note that the arguments were always in favour of the machine and never of the rider. Many seem to favour flat twins for the reasons that they get even firing, and in consequence parts must last longer, the machine thus being practically vibrationless, etc. I record my experience, in the hope that it may be helpful.

I lost my left leg in a motor accident about twelve years ago. To carry on, I bought a V twin motor cycle (6 h.p.). I am sorry to say that after a short journey it was almost impossible for me to walk. The stump of my leg became absolutely black, and the circulation was much affected, the continual thump of the engine seriously interfering with the flow of blood.

My doctor advised me not to ride a motor cycle again. I then purchased a small car—the Marlborough. All trouble with my leg disappeared. With the war soon came shortage of petrol. I decided to sell my car and come back to my first mount, the motor cycle and sidecar, but my dilemma was how to avoid a recurrence of my former leg trouble. I got out of this in quite an accidental way. I live about ten miles from anywhere, and my dog being bad I sent for the veterinary surgeon. In conversation, I told him how I was situated, and he strongly advised me to get a Douglas, which, in his opinion, was the most comfortable machine on the market. Accordingly I secured a second-hand $2\frac{3}{4}$ h.p., used it every day, and was free from trouble with my leg.

As the machine was not strong enough to take a sidecar, I obtained from a friend the loan of a 5-6 h.p. V twin and sidecar. I regret to say that in a week, although the loss of my leg is twelve years old, the same trouble with my stump reappeared, and I was unable to use my artificial leg for some days.

A return to my $2\frac{3}{4}$ h.p. Douglas solo was the natural sequel. Some time later I had the luck to secure a 4 h.p. Douglas and sidecar, which I have continued to use day in, day out, without leg trouble. This will show to my unfortunate friends (who, I am sorry to say, are in great number) what make of machine is vibrationless and comfortable, and what to adopt when similarly circumstanced.

Whatever criticism may be offered of these remarks, nothing can alter the facts here set out. I have no interest in Messrs. Douglas Bros. E. G. FERY.

DIFFICULT STARTING.

Sir,—Some time ago I suffered from the difficult starting of my B.S.A. As I have now overcome the difficulty, perhaps my experience may prove useful to others. I bought the B.S.A. new a year ago, and up till recently used it daily, Sundays included, in my delivery work. As this work involved from 120 to 130 restarts daily, it will be understood that easy and *sure* starting was of first importance. It was the uncertainty of it that puzzled me. A carburetter setting that would give a good start when engine was warm, say at 7 a.m., was useless an hour later, and I was compelled to push. This was exhausting work.

I tried different oil, plugs, etc., and tuned up the magneto without effect. I mentioned it to a friend one day, and he lent me a Binks carburetter, which proved a complete cure. Starting from cold is *not* improved, and I have always to push when engine is cold, but once engine is warmed up I can *always* rely on an easy and sure kick start. I have no interest whatever in Binks, Ltd., and consider the price asked for the carburetter high.

When, however, I can again use the machine I shall buy a Binks. As regards the B.S.A., I have nothing but praise for its reliability. In the whole eleven months I used it it never failed, no matter what the weather. During the heavy snowfall of last winter I was able to climb all hills here (Weston-super-Mare) when big cars, etc., were hopelessly stranded. The chief trouble I experienced was control wires, etc., rusting up and becoming useless after heavy rain. And when a wire breaks on the B.S.A. with the inverted controls and enclosed cables it is a long and tiresome job to get at and repair. The outside wires score every time for accessibility. I also find it difficult to keep the spring fork spindles lubricated; but no doubt we shall get these details attended to when peace comes.

In conclusion, I would strongly advise any business man who needs an economical means of delivery to consider the B.S.A. motor cycle; the amount of neglect it will stand is astonishing. S.W.

PLUG TROUBLE.

Sir,—I have suffered from much plug trouble with my A.B.C., which seemed to be capable of carbonising the oil on the plug points in a dozen "revs," after a long coast, with the result that they were bridged by a granule of carbon. However, I fitted a Reliance plug to the back cylinder and an old four-point Bosch to the front (I cannot get a second Reliance), and have never had occasion to look at either since. Incidentally, while experimenting, I fitted an old plug with a heavy copper electrode; as this metal has the highest heat conductivity of all, except silver, it should be ideal where overheating occurs.

A relic which gave good results was an old E.I.C. mica plug, which has a rather interesting history. It was thrown away as a dud by Mr. S. F. Edge at the Bexhill meeting in 1903. It has run thousands of miles since, the original platinum points being burnt right away, and was changed from one machine to another for years. R. C. MEESON.

MOTOR CYCLE V. RAILWAY TRAIN.

Sir,—In your "Current Chat" of February 28th you gave an interesting account of a bit of a "dust up" between a Powerplus Indian and the Union Pacific passenger train. The run appears to have been over a distance of twenty miles, and the train had the advantage of being double engined. All the more credit, therefore, to the motor cycle outfit, which won by ten minutes.

Like all these American yarns, this is one which seems to bear very little investigation. The following queries at once occurred to me, and I have been waiting to see if any other of your readers has noticed the same and found the explanation difficult. In the first place, on a run of twenty miles the time taken could not have been much over thirty minutes, but the motor cycle outfit won by ten minutes—that is to say, the train would be seven or eight miles away behind, yet the passengers on the train cheered the driver when he pulled up at the crossing. We are not told which driver it was the passengers cheered, but it seems to me to have been equally superfluous for the passengers to have cheered their own driver for losing by ten minutes (at least, he might have heard them cheer) as to cheer the motor cycle driver who was seven or eight miles away, and could certainly not have heard their cheers even if they could *see* him.

J. G. IRVING.

[The explanation is quite simple. The train had eight minutes start, was overtaken by the motor cycle, which presently drew up at the level crossing and waited for the train to pass. The passengers then cheered the motor cyclist. We did not imagine that all these details would have been necessary.—Ed.]

THE FLAT TWIN CRITICISED.

Sir,—In his eagerness to dance on my mangled remains, it appears to me that "Chinook," in your issue of May 2nd, falls himself into three errors:

1. The common journalistic one of showing the absurdity of something your opponent did *not* say.
2. In not realising that the torque of a flat twin with one cylinder *definitely cut out* is as regular (though not as frequent) as if both were firing.
3. In again asserting that, from the point of view of comfort, etc., good balance is of more importance than good torque.

As the first two are merely personal questions between us, they can be of no interest to readers; but it seems to me that the views of experienced designers would be of interest on the third point. In support of my view, I claim that the four, which has not perfect balance, is more comfortable than a flat twin with three-throw crank, or a 90° twin, both of which can be perfectly balanced. Also that a cheap American eight-cylinder, the engine of which dithers in the frame, is sweeter to ride behind than a Rolls-Royce six. Also the fact that the internal combustion turbine is constantly sought after and sighed for.

I claim that these facts show that torque is more important to comfort than balance, and therefore make the vertical twin with single crank well worth considering among twins for motor cycle use, as it has very numerous advantages over the flat twin.

I would also like to enter a humble protest against the way all supporters of the flat twin beg the question on the subject of balance. Their remarks always contain such phrases as the following: "Its perfect balance" or "its vibrationless running." I have ridden hundreds of flat twins, the products of five different firms, but only one engine out of the whole lot was vibrationless at high speeds. (It had a three-throw crank, and other stunts not found on conventional flat twins.) All the other machines vibrated more, all out, than the single-cylinder Singers on which Stanley used to race. But they were more comfortable to ride than the singles. Why? Torque.

B.E.F. A TILTER AT WINDMILLS.

MOTOR CYCLING FOR THE MAIMED.

Sir,—My knowledge of motor matters is negligible, but, being disabled myself, I am interested, and I would like to make a suggestion which I would have carried out, had I the means, so that I could get to some employment.

My suggestion is the conversion of a suitable 2¾ h.p. motor cycle into a tricycle by substituting a pair of steering wheels on a light axle for the one steering wheel. The necessary alterations of the front portion would not, I presume, be a very great job for an engineer. An arrangement like this, it seems to me, would be much better than a sidecar attachment for a 2¾ h.p. machine; but, of course, you will know better what the suggestion is worth.

As to controls, alterations to these would differ according to the individual. In my case, I have sufficient use in the right leg to manipulate these, and have also the use of both arms.

I am not incapacitated through the war myself, but I sympathise greatly with our poor maimed fellows, the number of whom is becoming so great. IGNORAMUS.

Leeds.

[An attachment similar to that suggested has already been on the market.—Ed.]

HIGHER GEARS FOR SOLO RIDING.

Sir,—I should like to put forward an appeal for more infinitely variable gears. Can none of the many motor cycle gear experts produce a small and fairly light friction gear with ratios variable between 3¾ and 11 to 1 for medium weights, 3-10¼ to 1 for heavyweighs, and 4¾-12 to 1 for low-powered machines? "Ixion" is always asking for light gear boxes, and I think that the friction gear box could be made very light indeed.

At present if we want a multi-gear we are practically restricted to the Zenith or Rudge-Multi machines, although the Philipson and Grado gears have proved themselves very satisfactory, but they both lack an independent clutch.

Personally, I think the Zenith Gradua with a countershaft in front of the engine is the best on the market because of the lower ratios provided, but really I ought not to make this statement, as it has never been my luck to ride one. I have tried a Rudge-Multi, and I found it a delight to drive, but lacking a lower gear than 7½ to 1.

No one who has not tried a multi-gear has any conception of the pleasure derived from careful handling of the gear lever and the feeling that one is nursing the engine and getting the very best out of it; but, on the other hand, there is a certain kind of rider who will approach a hill on the top gear provided by, say, the Rudge-Multi, and wait until the engine begins to knock, and then yank the lever right back as if it were only a two-speed, instead of easing the lever back by degrees.

I remember reading somewhere an article about a very novel and interesting variable gear of the friction type called the Dallison gear, and that gear, to my mind, fills the bill exactly, because it could be adapted to suit chain or chain-cum-belt or even shaft drive. At first sight, this particular gear appeared somewhat complicated, but, once understood, seemed almost unbreakable and wear-proof.

I should very much like to know whether any attempt has been made to market the Dallison gear, and whether any machines will be available after the war fitted with it.

My ideal machine would be somewhat after the following lines. The engine would be a four-cylinder 8 h.p. air-cooled, with Binks carburetter, and C.A.V. magneto. The transmission a neat countershaft friction drive, infinitely variable between 3 and 10 to 1, XL-All saddle, semi-T.T. bars, 26in. × 3in. Palmer Cord tyres, quickly detachable wheels, an internal expanding brake on each wheel, and an accelerator pedal in conjunction with the usual hand levers.

Such a machine would be capable of very high speeds, and would be very docile in traffic owing to the multi-gear and accelerator pedal. ARGON.

POSITIVE VALVE OPERATION.

Sir,—*Re* statements about the Hinks valve in *The Motor Cycle* of May 9th, surely the cam which compresses the spring, and so closes the valve, has as much work to do as an ordinary cam has in compressing a spring and opening an ordinary valve? With the ordinary type of valve the cam has to work to force the valve open against the force of the compression in the cylinder (exhaust valve) and to compress a spring. With the Hinks valve, the opening cam has only the force of compression in the cylinder on the top of the valve to work against, but the closing cam has to work against a spring pressure, the same as in the case of the ordinary type valve, in order that the two types of valves may be held equally firmly on their seats.

Re "Induction Pipe Design," the ambition of the designer of induction pipes seems to be to put them where they can get as red-hot as possible. Surely the expansion of the indrawn air due to this heating will lessen the mass of gas drawn into the cylinder each induction stroke? The happy medium seems to be to keep the pipe just hot enough to supply the latent heat of evaporation to the amount of petrol being used.

BREEZY II.

Oxford.

[The spring in the Hinks valve is compressed about $\frac{1}{64}$**in.**, while the usual spring is compressed to the extent of $\frac{1}{4}$in., or sixteen times as much; it is also lighter. Hence the difference in work done.—ED.]

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—May I ask the favour of a few lines in your valuable paper to correct the impression given by "A Few M.T. Fitters, R.A.F.," in your issue of May 2nd?

Having had a varied experience both in Blighty and Overseas as a D.R. with the R.F.C. (now R.A.F.), I have never heard a more ridiculous statement than that no driver of either a motor cycle or car under any circumstances is allowed to do any repairs or adjustments whatever to his machine. Our P. and M.'s possess a moderate-size toolbag, but the makers seem to have overlooked the accommodation for the fitter, whose services would certainly be required on the long runs and conditions prevailing out here, especially during the past six weeks.

I conclude that "A Few M.T. Fitters" have had little or no experience with squadrons Overseas. May I ask, how many squadrons on active service have a motor cycle fitter on their strength? I know of quite a number without a single one of these important individuals, and all repairs and adjustments are done by the cyclists taking over the machines.

J.R.B.

B.E.F.

Sir,—May I be favoured with a small space to reply to "A Few M.T. Fitters, R.A.F.," in your issue of May 2nd, and also "A.F.C., Canterbury." During the past few weeks I have spoken to a number of fitters and cyclists on this matter, and they all are of the opinion that it is very unfair. The few who sign themselves "M.T. Fitters" may be exceptions. Coming nearer the point, we will suppose a cyclist is on the night stunt at headquarters. He arrives at a point twenty-five miles away from his unit. Snap goes his driving chain. Yes, only a chain breaks, but with the usual results. He finds those paper chain cases wrapped in the back wheel as usual. His orders must be at their destination before ten o'clock. He takes the sidecar off, and in half an hour the road looks like a tinsmith's shop. He looks through his spare parts, but he does not find an M.T. fitter, so he starts to reassemble and complete the job while those M.T. fitters are sleeping. Then he wonders why he should be classed non-technical. Doing repairs of this kind at the workshops in daylight, with all the tools necessary for the job, is not to be compared with it. When the order came out that a cyclist had not to keep his own mount serviceable I do not know. It is not so in the K.B.S. I agree with "A.F.C." when he says he would like to see every man go through a real test and get his 1st A.M. by his abilities.

OVER SEA.

B.E.F.

Sir,—I agree with "Six First-A.M.'s." It is absurd to class them as non-technical; but, at the same time, after what I have seen of the men and N.C.O.'s of this corps, I am inclined to doubt that promotion is an acknowledgment of efficiency. Perhaps they will think the same when they read the following two cases that came under my notice whilst "out West."

The first one concerns a man who went from second-A.M. to corporal in about five months. This same man put a Renault engine together five teeth out of timing. When his error was pointed out to him by a second-A.M., he wanted to know if it would matter.

Case No. 2 deserves to go down in the history of this war for all time. It concerns a flight sergeant. A machine had just landed; the pilot had got out and was standing by, when the sergeant asked him how it was going. The officer replied, "Fairly well, but I think there is one of the cylinders missing." The sergeant jumped on the skid, *counted the cylinders*, jumped down again, took a few regimental paces up to the officer, saluted, and reported, "Cylinders all present, sir."

Too idiotic to be true, you will think, but perhaps some of the R.F.C. Mons men will bear out the above cases.

Birmingham. RED, WHITE AND BLUE.

Sir,—May we be allowed to encroach a little on the valuable space in your correspondence column, heartily to corroborate the remarks that have been made by several of your readers concerning motor cyclists in the R.A.F. We all feel that an injustice has been done by classifying us as non-technical, when we continually do technical work under the most adverse circumstances. When at our particular squadrons or H.Q.'s, very exacting repairs and adjustments have to be made (often against time) with the minimum of facilities, and when on the road the quick delivery of despatches depends entirely upon the cyclist's ability to cope with any mechanical trouble likely to cause delay.

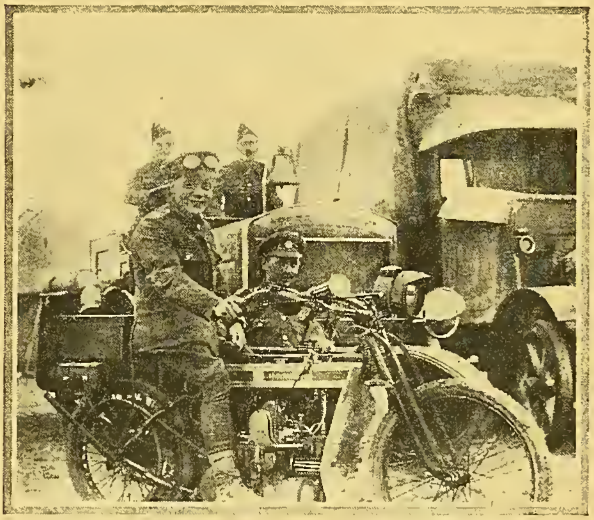
However perfect a machine may be, it is impossible to keep it at the high degree of efficiency demanded by active service conditions, unless the rider possesses a sound knowledge of "all the ills an 'iron' is heir to"!

Motor cyclists, as a body, are the least recognised of any of the "trades" in the R.A.F., in spite of their splendid work, carried out uncomplainingly under the vilest conditions, and it amounts to an insult when they are classified as non-technical.

For the person concerned in this "oversight" we recommend a few chilly battery runs, over prehistoric road surfaces, on a pitch black, soaking night! If during such a run he should be so unfortunate as to have a chain breakage, or other similar slight mechanical derangement, we feel confident that even such a trivial affair in the D.R.'s life would convince him of his inability to realise the true value of the R.A.F. cyclist's work!

D.R.'S, R.A.F. PATTERN (SIX OF).

B.E.F., France.

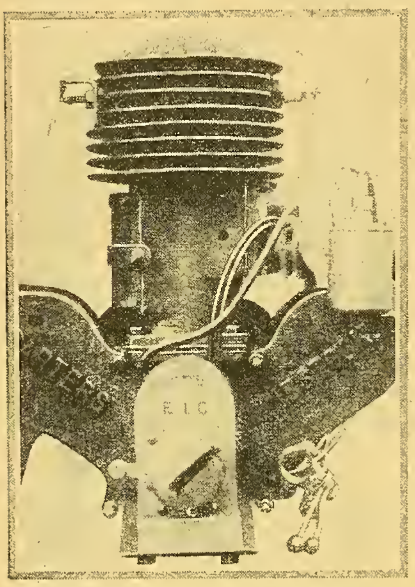


A.S.C. men aboard a Douglas sidecar outfit in Basra, Mesopotamia. Note the Merryweather fire engine.

A 500 c.c. TWO-STROKE.

A New Engine Unit for Post-war Motor Cycle Assemblers.

ALTHOUGH the comparatively large single-cylinder two-stroke engine so far has not proved a success, there appears to be no reason why a 500 c.c. engine of this type should not eventually be made to give results proportional to those of the smaller simple two-stroke engine. True, the difficulties appertaining to questions of lubrication and over-heating become disproportionately greater as the cubical capacity is increased; but there are many designers who maintain that had the larger type been given the same attention as has been paid to the lightweight engine these difficulties would have been overcome ere this.



The Carter 500 c.c. two-stroke. Note that the crank case, engine plate, and magneto platform are cast integral.

Mr. H. P. Carter, of Ibstock, evidently is of this opinion, as he has designed a 500 c.c. two-stroke engine with the intention of marketing it as a unit for the benefit of the many makers of motor cycles who prefer to leave the engine to those whose special study it is.

The first engine of the new design is here illustrated, and in fairness to the builder it should be remembered that the construction of such an engine at the present time is an undertaking fraught with many difficulties, which will explain the somewhat rough finish of the engine.

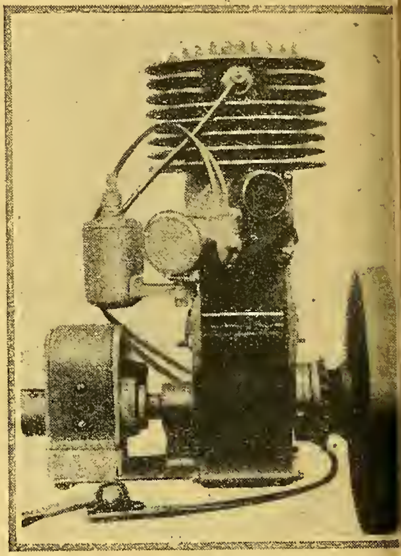
Novelty in Design.

The engine follows conventional two-stroke practice on general lines, but there are one or two novelties, *e.g.*, in the combined exhaust and inlet manifold and the magneto position.

It will be seen that in the Carter engine the crank case, engine plates, and magneto platform are cast integral, whilst the transfer passage has a detachable cover. The cylinder dimensions are the same as the usual $3\frac{1}{2}$ h.p. four-stroke, *i.e.*, 85 mm. bore and 88 mm. stroke.

Mr. Carter appears to have given special attention to the question of bearings, which are of ample size. The plain phosphor bronze bearing in the flywheel side is 3in. long, 1in. inside diameter, while on the magneto side the bearin is $1\frac{3}{4}$in. long. The big end bearing $1\frac{1}{4}$in. × 1in., and the small end of th connecting rod has a bearing $1\frac{3}{4}$in. × $\frac{1}{2}$i

The arrangement of flywheels and cran pin is the same as in the usual fou stroke, but, of course, smaller. Th fins on the cylinder appear to be on th thick side, but are very deep.



Showing the ample size of bearings on the Carter engine. A combined exhaus and inlet manifold is adopted.

* * *

A FEW SIDE-SLIPS.

Notes on "Ixion's" Criticism of "Skids and Skidding."

IT might be of interest to add a few details to my previous opinions on rough-rider mounts, with a special reference to the points raised by "Ixion" in his informative comments thereon.

The Scott.

The machine was slightly modified in so far that the front wind shields and the auxiliary silencer were removed; despite many falls (far more than one experiences in a season's joy-riding), nothing was broken, but I cannot say how many times the footboards were knocked off by dropping into deep ruts!

In the sporting event mentioned I suppose it goes without saying that the "well-known amateur" was the inferior rider, and, moreover, the falls he experienced were on hard, and possibly stony, roads, and taken at high speeds. Under such circumstances, breakages are almost inevitable, and it is quite likely that had he been riding a single-cylinder machine he would have scraped away all the radiating fins from the valve chest before the end of the journey was reached.

No! my contention for the Scott was this. Under conditions where the average rider would inevitably crash sooner or later, this machine is the most conducive to a postponement of the fateful hour—thus, if I were a doctor in a moorland village, with cart tracks to cover as frequently as roads, I should choose the Scott in preference to any other machine.

Unfortunately, I have not yet had the opportunity of testing the machine which "Ixion" has praised so long and consistently, but if the war last many more years I may be granted leave some day, and will hasten to become acquainted with later developments in the spring frame line.

Engines and Gears.

I am afraid we should never agree on this point. "Ixion" can tolerate a high revving engine at low road speeds and I cannot. Agreed that the torque of all types of engine is not radically different, and that all need a gear box, there yet remains the fact that some need the latter more than others.

To compare the Scott and Douglas. The latter was probably faster than the former, even on its middle gear, but on top it was too suddenly in difficulties with any falling off in speed, hence the second and low gears were constantly in demand, and the driving was largely don "on the gears"; the Scott would pull s slowly on top that in a sudden tigh corner there was always a permissibl slowing down period during which a comparatively leisurely change into low could be effected—in short, the driving was mostly "on the throttle," and infinitely easier when correcting recurring figures of eight.

Incidentally, it may be observed that the Douglas gear change is beautifully "slick"—a point which "Ixion" demands.

Road Surfaces.

These were indeed "truly impossible." One has merely to visualise rain-sodden pasture land over which some thousands of lorries, many with locked wheels, etc., have been towed.

In short, the man who would by choice ride over such surfaces may be classed with those referred to by a blunt Yorkshire farmer to whom I put the question, whilst I was in the midst of a single-geared, uncharted crossing of the Langstrothdale Chase, "Do many motorists come this way?"

Said he, "Noa! Nobbut a few foo-ils!"

WHARFEDALE.

QUESTIONS & REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Sizes of Jets.

Could you please inform me of the respective sizes of the three jets attached to the Binks-Douglas carburetter?—H.E.W.

We should advise you first of all to try jets 000, 1, and 7, and if this combination is not satisfactory, try experimenting with different sized jets according to Messrs. C. Binks's printed instructions. It is practically impossible to give you the exact combination of jets to suit any particular engine, but those mentioned are the average.

Valve Timing of 1911 Triumph.

Would you be good enough to tell me if the following is the best all-round timing for a 1911 3½ h.p. Triumph: Inlet begins to open on dead centre and exhaust to close on, or one tooth after, dead centre?—E.G.W.

The correct timing of the Triumph model mentioned would be as follows: The exhaust valve opens ⅜in. from the bottom of the firing stroke, and closes dead on top of exhaust and induction strokes. The inlet valve begins to open when the piston is at the top dead centre of the exhaust and induction strokes, and is closed when the piston has moved up ⅜in. of the compression stroke.

Accurate Valve Cam Design.

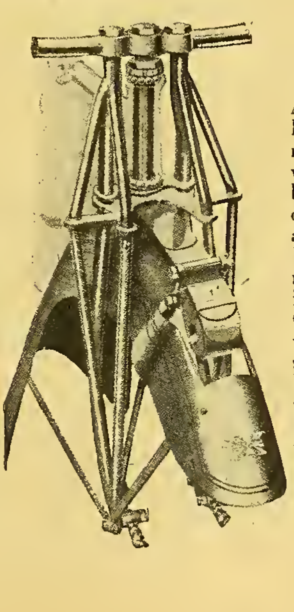
Can you recommend any book that gives diagrams and instructions relative to the design and setting out of valve cams for roadster and racing machines?—E.F.A.

You evidently want an exhaustive book on design which is not covered by the ordinary handbooks. We should recommend Vol. I. of "The Gasoline Automobile," by P. M. Heldt, price 23s., from the publishers of *The Motor Cycle*. Our ordinary handbooks, "Motor Cycles and How to Manage Them" and "The Autocar Handbook," give valve timing and diagrams, and, of course, deal with many other subjects also, but do not enter into the manufacturing methods adopted by engine makers. *The Autocar* diagrams of valve and ignition setting might be useful; these apply to four and six-cylinder engines. Most makers guard the cam design and setting of valves of racing engines as a manufacturing secret, and even the most talented engineers and designers differ in opinion on the subject. You will gather from this that there is no standard design.

Scott Gear Adjustment, etc.

I have just purchased a second-hand 1914 Scott motor cycle. (1.) When I bought the machine I was unable to have a trial run, but noticed that the low gear would not grip at all. I have taken the gear out of the frame, and noticed that there are washers on each side of the gear pedal. Are these for adjusting purposes? (2.) The machine is fitted with a two-jet Binks carburetter. Would the three-jet Binks give greater economy in petrol and slow running? (3.) Would you please state roughly the petrol and oil consumption of the Scott with the two-jet Binks, carefully driving at twenty miles per hour solo; also roughly the maximum speed on the level?—H.W.T.

(1.) The spring washers on either side of the quick thread drum are intended to lessen the shock of movement on the thrust rod. The small ¼in. washers on the thrust rod are a means of adjustment. With the aid of these it is possible to make the low gear pedal go further down or higher up. (2.) The three-jet Binks is a considerable improvement over the two-jet, especially as regards slow running, and with the former there is no hesitation when changing over from one jet to another, consequently it is more economical in petrol. (3.) It should be possible to get sixty to seventy miles per gallon solo, and two to three hundred miles per quart of oil. About forty-five to fifty miles an hour.



The new American Excelsior military fork, which has been specially designed for army service. It will be noticed that it is double-trussed to withstand side strain. For heavy sidecar work this improvement will be of great advantage.

The Safety Spark Gap.

When overhauling my magneto (ZEI), I found on the armature, which seems to be all covered up with insulating tape, *an end* of the wire, about ¼in. long, exposed and quite uncovered. What is this wire for?—D.H.J.

The wire in question is the safety spark gap, and is quite in order. It prevents undue strain on the winding and insulation of the armature if the magneto is allowed to run with the high-tension wire detached from the sparking plug or terminal on the magneto slip ring.

A Magneto Trouble.

I have purchased an old air-cooled twin-cylinder cycle car and a second-hand twin magneto. On trying to get the latter to spark, I find it will only do so when turned by hand. Immediately the chain is put on it refuses to spark at all. What can be the cause of this?—D.F.

A magneto cannot be short-circuited by its drive, and we can only suppose that the bearings are very badly worn and the pull of the drive causes the armature to touch the pole pieces at one end. This would not be the case when turned by hand.

Free-of-duty Petrol.

I am using my 3½ h.p. motor cycle with sidecarrier attached for conveying myself and material used in my business. I use it solely for this purpose, and always with the sidecar. I have a free-of-duty petrol permit for two trade motor lorries, and I use the petrol obtained for them for my motor cycle as well. I have not taken out a local taxation licence for the motor cycle, as I could not then use this petrol. The local taxation authority now want me to take out a licence. Under the above circumstances, can I legally use the motor cycle without a licence?—S.G.

If the machine is fitted with a sidecarrier box, bearing your name and business address, and the sidecar frame is secured to the motor bicycle by means of a steel pin driven through one of the nuts and bolts attaching it to the bicycle, so as to render the combination a permanent fixture, you are entitled to use free-of-duty petrol, and you need not pay the local taxation licence. If the combination were used once during the year for any other than business purposes you would become liable for the full tax.

Overhauling a Magneto.

I have a magneto which is out of order, and I cannot understand what is the matter with it. I can only get a small spark from it. Do you think it wants remagnetising?—D.L.

There is not very much that an amateur can do to a magneto in the way of overhauling it, but you might verify the following points: See that the carbon brush is making good contact on the slip ring and on end of armature at the back of contact breaker plate; also that the springs of these brushes are sufficiently strong to make good contact. If the ends of the brushes are polished, rough them over lightly with glass paper, and clean the slip ring by inserting a clean rag soaked in petrol and rotating the armature-shaft. Take off the contact breaker, clean the platinum points with a jeweller's file, and adjust them to break .4 of a millimetre or to gauge, and wash the contact breaker in a little petrol. If after that there is not a good spark, we should recommend you to send the magneto to a firm of repairers.

Loss of Power after Repairing.

I have a 4½ h.p. Singer combination. A short time ago I broke the big end of the connecting rod, and not being able to obtain a new one I had it welded, and on fitting it up I find that it is rather a tight fit on the crank pin. In taking down the engine we did not interfere with the timing gear side of the crank case, or the magneto, but got at the broken big end from the other side, removing one flywheel off the crank pin. After thoroughly cleaning the engine we have reassembled it in the frame, and it behaves as follows: It fires fairly easily, but the explosions are very slow, even when the throttle is fully open and are at about the same pace as when the throttle is a quarter open under previous conditions. When put into a lower gear and the clutch let in gradually the engine goes for a few yards, labouring the whole time, and then peters out. It will take scarcely any air. The symptoms are rather difficult to explain. We have seen that the following points are in order: (1.) That the carburetter is working perfectly, and there is a good flow of petrol, also that the induction pipe has no air leaks. (2.) That, upon placing the plug on the top of the cylinder, and wheeling the machine, a good spark occurs at the points. (3.) That the compression is good, as it skids the back wheel when the exhaust valve lever is dropped. (4.) That the gears are in order and the clutch not slipping.—B.A.F.D.

The trouble may be due to the big end being too tight a fit on the crank pin. If it is not abnormally tight this will remedy itself after a little use, otherwise the bearing may seize. If the trouble is not a tight bearing, the flywheel assembly is possibly out of truth. Run the engine gently, lubricate copiously, and see if there is any improvement. The carburetter and ignition are evidently in order. In all probability the reason that the engine will take practically no air is because it cannot get up enough speed to warrant it.

Speedometer Gear Ratio.

Can you give me the following information: I have a Jones speedometer on my 7-9 h.p. twin Swift runabout. It is driven from the propeller-shaft. The pulley on the speedometer cable is 4in. diameter. What should be the diameter of the pulley on the propeller-shaft? The back tyres are 710×85 mm.—J.R., Lt. R.A.F.

The information you require can only be supplied by the agents for your speedometer, Messrs. Markt and Co., Ltd., 100, Clerkenwell Road, London, E.C.1. There is a formula for working the ratio in the handbooks of some makes of speedometer, but not of the Jones. The Jones has usually an expanding adjustable V pulley.

The Wheel Mystery.

I have been arguing with a non-motorist to the effect that the top of a wheel when under speed on the road travels faster than the part which is in contact with the road, and he maintains that it is impossible unless the wheel gives to some extent. I should be much obliged if you would answer this for me and also inform me of the relative speeds of top and bottom.—C.S.J.

Your point of view is correct, for a vertical diameter of the wheel may be regarded as a lever, the fulcrum of which is the ground. Any point above the hub has a linear velocity equal to that of the hub (*i.e.*, that of the machine) *plus* a velocity due to the rotation of the wheel. Thus the total velocity of a point on its periphery vertically above the hub is double that of the machine. The bott point of the wheel is stationary. Th matter has been dealt with in the pag of *The Motor Cycle* several times, and most elementary article which explain it fully was published on April 17 1917, a copy of which issue you m obtain on application to our publishi offices, 20, Tudor Street, London, E.C

To Overcome the Difficulties Imposed by the Paper Shortage

□ □ □

At the present time, owing to the shortage in the supplies of paper for printing purposes, the production of newspapers is beset with difficulties, but by eliminating chance sales—with the consequent risk of copies remaining unsold, which leads to paper being wasted—it is hoped that the weekly demand for *The Motor Cycle* can be met, and all *regular readers* supplied with copies.

To those readers of *The Motor Cycle* who have given a definite order to their newsagents, the publishers tender their appreciation and thanks.

To those who have not yet done so, the publishers again make their urgent request that a definite order be placed at once.

Please give an order for "The Motor Cycle" to your Newsagent To-day.

Mending a Leaky Float.

(1.) Would you please tell how to get petrol out of carburetter float? (2.) Wh effect has a punctured float on t running of the machine?—A.F.

(1.) Drive a fine needle into the *top* the float, then put the float in a saucepa ful of hot water, stand it on a stove, a let the water boil. Petrol vapour w then be seen bubbling up from the origin hole *and* through the fresh hole ma with the needle. The boiling should continued until the float is entirely empt and then the leak and the hole you ha made should be skilfully soldered wi silver solder. If you cannot do this you self, mark the two holes and take the flo to a working jeweller, and ask him to u as little solder as possible. (2.) Whe the float is punctured it does not cut o the petrol, the carburetter floods exce sively, and the engine will stop.

Fitting a Magneto Switch.

(1.) Please tell me the advan tages and disadvantages of magneto cut-out. (2.) How t fit one to a two-stroke moto bicycle? (3.) If they are o advantage, why are not machines fitte with cut-outs when new? (4.) Wil such a contrivance injure the magneto —S.G.T.

(1.) The advantages are that you ar able to stop the engine independently o the exhaust lifter; consequently if th exhaust lifter wire breaks, you have means of stopping the engine other tha by throttling down. The only dis advantage is that there is an extra wir through which short-circuits may occur. (2.) Write to the makers of your magnet and ask if they supply a contact breake cover with a switch terminal. Buy a magneto switch from any accessory dealer, and connect a piece of low-tension wire from the switch terminal to the terminal on the contact breaker. (3.) Because the magneto and machine makers conside that the exhaust lifter and throttle are adequate provision for stopping the engine, and for the reason given in reply to 1. (4.) No.

RECOMMENDED ROUTES.

Basingstoke to Bexley.—F.J.D.

Basingstoke, Odiham, Farnham, Guildford, Leatherhead, Sutton, Croydon, St. Mary Cray, Bexley.

Rugby to Halstead.—H.R.

Rugby, Northampton, Yardley Hastings, Bedford, Great Barford, Eaton Socon, St. Neots, Cambridge, Linton, Haverhill, Halstead. To return *viâ* Newmarket, we should recommend you to go *viâ* Sudbury, Long Melford, and Newmarket to Cambridge, thence by the route previously given.

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and you once more use your bike, do away with pre-war standards of efficiency and fit the C.A.V. MAGNETO Tested by War and found unequalled

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Preparation of Post-war Models.

WE wish particularly to draw the attention of all British manufacturers of motor cycles to the letter published on another page from the chairman of the Motor Industry Branch Committee of the Engineering Trades (New Industries) Committee of the Ministry of Reconstruction. We referred a few weeks ago to the formation of this Branch Committee, and on enquiry we ascertain that the direct representation of the motor cycle interest upon it is now assured by the inclusion of Mr. J. W. Stocks, of Components, Ltd., and Mr. C. A. Hyde, of the B.S.A. The object of the Engineering Trades Committee is the development of new industries and particularly of the manufacture in this country of products previously imported from abroad. It is, however, very difficult to distinguish exactly between a new industry and a new product of an established industry, and, therefore, it is only reasonable that the Committee should include within its scope the encouragement of the production of new models representing improvements over those manufactured before the war. Moreover, now that the great majority of motor cycle manufacturers are building almost anything but motor cycles, it is quite evident that, unless they can make real practical progress with their after-war plans while the war is still going on, there will be a long hiatus between the conclusion of peace and the production of new types of motor cycle. It may be that some manufacturers will feel that their requirements as regards materials are so insignificant that they will be able to proceed with the preparation of their plans without making any special requisition for supplies. Now, it would obviously be impossible to make application for labour through the official channel without making a simultaneous application for material. Without the material the labour cannot be used, and if the use of material had not been authorised, questions would naturally be asked as to how the labour was going to be employed were it rendered available. Under all the circumstances, we strongly advise every manufacturer of motor cycles or accessories to make his application in the proper form through this Committee. It would not be safe to take it for granted that the Committee will be able to obtain everything the manufacturer wants. Much depends on the Priority Department, and we all know how difficult it is to get authority to use either labour or material for any other than immediate war purposes.

Journalistic Self-respect.

WE wish to endorse most heartily the comments made in *The Autocar* last week on advertisements in the guise of editorial matter. The facts are: An advertising agency secured the insertion in various journals of what purported to be editorial articles, though the space they occupied was paid for. These articles dealt with political matters, about which we do not intend to express any opinion, but we think there can be no two opinions on the policy of any newspaper which lends its columns to such a scheme.

The principle maintained by *The Motor Cycle* and its sister journals is that the editorial and advertising departments should be kept entirely distinct. The editorial side is reserved for the expression of views which are, in our opinion, best in the interests of our readers. These views may or may not coincide with the opinions of our advertisers, but in this way only can a journal arrive at an authoritative position in its own sphere, and one in which it can be of real use to reader and advertiser alike.

We refer to this unpleasant matter only and solely because we wish to emphasise our opinion that journalistic self-respect and commercial policy are coincident when the editorial and advertisement sides of a journal are kept quite separate.

An index to the advertisements in this issue will be found on the page facing the back cover

OCCASIONAL COMMENTS

BY "IXION"

An Alternative to the Dynamo.

I HOPE the British trade will not let itself be stampeded into dynamo lighting for motor cycles after the war without mature consideration. I quite admit that a good dynamo set is probably the perfect light, but I still suffer from misgivings on its application to motor cycles, and especially to bicycles unadorned by sidecars. The dynamo set is weighty and expensive. It is made or marred by its accumulator, and though I have tested practically every accumulator, including two or three specially manufactured for bicycle use, I have yet to try one on which I would gamble in any important ride by night. Again. the low price limits of two-wheelers are sure to create a demand for cheap sets, and ignorant buyers will foster this demand. I have a variegated experience of cheap dynamo sets, in which cheapness was determined by a far higher price limit than motor cyclists can ever afford, and, frankly, I distrust the cheap dynamo. Yet again I notice that American designers are either extremely optimistic or extremely dishonest where cheap electrical goods are concerned. They pass stuff which would provoke the shoddiest British manufacturer to clump the seller over the head with a crankshaft. But even the purveyor of the cheapest American stuff is apt to shy at electric lighting for motor cycles, and to pin his faith to the Prestolite.

The Prestolite System Anglicised.

IT has been a source of wonder to me for years that the Prestolite system, corresponding to the British D.A. (dissolved acetylene) products, has never made good over here. To judge by what one reads of American roads, night riding in the States must be some proposition. Neither is there a repairer round every corner, nor a friendly depot within a mile or two of every potential breakdown; yet the dissolved acetylene system has been almost universal in the U.S.A. for years, so far as motor cyclists are concerned. You cannot open an American technical journal without encountering huge displayed advertisements of it; nearly every photograph of machines in use in America reveals the familiar storage tank.

Experiences with D.A.

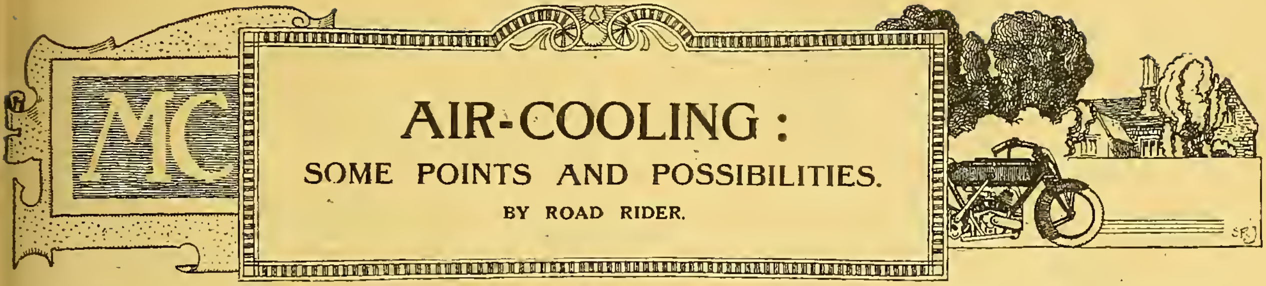
I HAVE hardly used the dissolved acetylene on cycles for reasons which I will presently expound, but I have given it prolonged tests on cars and cycle cars, and to my mind it has the acetylene generator beaten to the wide, and whilst equalling a first-class dynamo on every point except the substitution of a match for a switch, it beats any dynamo made on first cost. To sum it up, it ensures you a permanently clean burner, instantaneous lighting up, guaranteed light without any flickers or jumps throughout a whole night ride, and all this at a very low cost. It is as clean as electricity, and a leaking connection is the sole trouble you need fear. Moreover, an acetylene leak is far easier to trace and repair than a wiring fault.

The Cause of its Obscurity.

THE simple fact is that the D.A. Co. has never inaugurated a proper publicity and supply system in this country. The demand for the cylinders especially in the baby size, has never been great, and the vendors presumably could not afford to splash a few thousands on winning a market. Nobody dreams how good the stuff is. A few individuals, like myself, are aware that the cylinders probably afford the best and cheapest lighting available for small motors and we invest, only to run our heads against two snags, neither of which need complicate the position for a day if stringent measures were taken. In the first place, the smallest size of cylinder is either a little too large for motor bicycles, or the wrong shape. You can house it, but the American Prestolite Co. is far cleverer at greasing the slips for its customers (doubtless because it can reckon on some big trading). Secondly, the depots at which spare baby cylinders can be obtained are few and far between (again owing to the limited demand, which in turn is due to poor publicity). Thirdly, any lighting system based on storage cylinders is only ideal when duplicate cylinders are carried, just as no electrical enthusiast ever feels really cosy unless he has a spare battery aboard. We can house one cylinder of the existing dimensions on a bicycle, but we cannot house two. When our solitary cylinder is nearing the empty point, we feel it will be wise to exchange it at the first opportunity. We get no rebate on the whiff of gas remaining in the old cylinder, and we cannot bear wasting it, just as a hardened toper usually swigs his dregs. If the D.A. people care to market sets consisting of two small-sized cylinders, and take steps to inform motor cyclists that they can offer a sound lighting proposition, the cheap dynamo will be gingered up to show what it can do, and it will not prove a winner even at that.

Cleaning the Sparking Plug.

PREVENTION is better than cure, and air mechanics do not wait for a sparking plug to soot up in use. They inspect, and if necessary clean, all plugs at regular intervals. If motor cyclists adopted a similar routine, they would protect themselves from annoying stops by the roadside, and save their plugs from being stove-enamelled a rich black during long periods of inattention. If a plug does not lend itself to cleansing by means of a wire brush or other scraper, it is a good tip to immerse it in a tin containing a strong solution of washing soda, stand the tin in a pan of water, and boil the lot for ten minutes or so. The double container is advised because the soda solution boils over rather readily.



AIR-COOLING:

SOME POINTS AND POSSIBILITIES.

BY ROAD RIDER.

Our contributor in this article illustrates the great advantages that would accrue from alteration in the design and manufacture of motor cycle cylinders and combustion heads. He argues that if they were made on the lines of aircraft engines with steel cylinders, greater uniformity would result, and such cylinders would not tend to warp unduly under the influence of variations of temperature at different spots in the combustion head and the fluctuations of cooling draughts. It should be borne in mind, however, that cost is hardly considered in air engine production, and steel cylinders require extremely accurate and expensive machine tools to make them commercially possible on any but the most expensive motor cycles.

SOME of us have been rather "narked" during the past four years by the contemptuous way in which the brass hats of the R.A.F. regard our dearly beloved motor cycle engines. But, after all, *we* did not design these despised power units, and it may be that the scoffs we have resented are rather intended to lighten our lot in the future than to break our heads. So let us have a look at a typical pre-war air-cooled engine, see if the criticisms are justified, and if the "prognosis" (as the Harley Street specialist calls his prophecy that your cancer will recur in two years) is favourable.

Motor cyclists are all one family, and inside the family circle we do not mind confessing that some of our pre-war engines possessed certain serious faults, all of which point to inefficient cooling.

For Example.

1. Many were very fastidious about sparking plugs: the queries columns of this journal used to bristle with sparking plug troubles. The trouble was usually that, if a plug had a very thick electrode, it sooted up; if it had a very thin electrode, it became incandescent. (*Heat* is the obvious culprit.)

2. On the rare occasions when a standard touring engine was driven all out for several miles, it incontinently had a fit of what the Purple Pill advertisements call "that tired feeling." The popular theory was "incandescent sparking plug electrodes." (*Heat* once more.)

3. The hotter our engines got, the worse they ran. This was true, even if they did not "konk out" altogether. In particular we noticed that the compression got weaker and weaker, as the engine grew hotter, suggesting that the various "compression seals" (valves, piston rings, etc.) had shrunk or grown lob-sided, or "distorted."

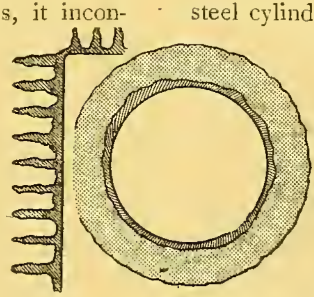


Fig. 1.—Sections showing in an exaggerated manner the irregular walls of a cast iron cylinder.

Oil-cooled not Air-cooled Engines.

4. We were compelled to use lashings of oil. Scoffers always said that our alleged "air-cooled" engines would better be described as "oil-cooled." Whether this was true or not, we undoubtedly used too much oil, and we had to splash it into the crank case in great dollops every four miles or so: for when the constant trickle "drip feed" was introduced, the number of engine repairs went up by leaps and bounds, so that leading manufacturers hastily reverted to the hand pump. (*Heat* again.)

5. Of this absurd oil consumption, a large portion slowly baked itself into a hard crust and deposited itself over the piston tops and the interior surfaces of the combustion chamber. Fortunately we could whip our cylinders off much more speedily than could the owner of any other type of motor: and then we dug the filth off with chisels and glee. (*Heat* again.)

6. Pre-war motor cyclists periodically laboured at a spare time occupation known as "valve-grinding." Alternatively, they sent their valves back to the factory to be refaced in a machine tool. The valves became pitted far more rapidly than those of a water-cooled engine. (*Heat* again.)

Heat—its Causes and Cure.

I now propose to desert symptoms and to pry into causes and cures.

In the first place the 1914 engine possessed in practically every case a cast iron cylinder (I believe the steel cylinders of the A.B.C. were the sole commercial exception). One face only of these cast iron cylinders could conceivably be true, namely, the internal bore, which was accurately machined and ground; in other words, the hollow in the cross-section was a true circle. The exterior of the cylinder was not machined, either because of the cost of entering a tool between each pair of radiating fins, and the difficulty of gauging when such a tool had bitten down the wall to the exact thickness required, or because the rough metal radiates heat better than a perfectly smooth surface. Neither was the exterior cast dead true, because—regardless of expense—absolute accuracy in the coring of such an intricate piece of foundry work is a sheer impossibility. In other words, a cross-section of a cast iron cylinder wall (taken between two fins), as exaggerated under a magnifying glass, would appear something like the caricature in

Air-cooling.—

fig. 1. Now, supposing that such a wall was machined true inside, received an even degree of heat all round in working, and received an even draught all round in motion, it could not possibly hold its internal bore truly, because the radiation of heat from such an irregular section would always be irregular. One part must be hotter than another. Expansion varies all round the wall. The wall warps.

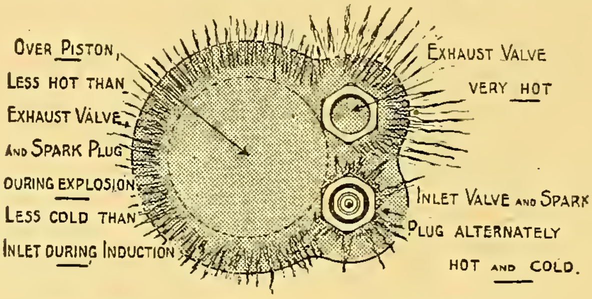

Over Piston, Less hot than Exhaust Valve and Spark Plug during explosion. Less cold than Inlet during Induction
Exhaust Valve very hot
Inlet Valve and Spark Plug alternately hot and cold.

Fig. 2.—Showing local variations of heat in combustion head.

Where Warping has the Most Effect.

Warping of the wall towards the foot matters little, as the base of the wall is rather an oil retainer than a compression holder. The lower half of the cylinder barrel has nothing much to do with retaining the compression, and exists chiefly to hold the cylinder head on, to prevent oil from escaping, and to provide a bearing for the piston. But the nearer we get to the head of the cylinder the more disastrous are the effects of the warp. Increased piston friction occurs at one point, oil escapes at another, compression leaks at another—these are some of the obvious consequences.

So far we have pretended that the reception of heat was even all round the wall. This is simply a grotesque lie. It is just as uneven as it can be. Fig. 2 is a plan of the combustion chamber or cylinder head. It shows first a very hot spot on the right front, where the exhaust valve lives in an inferno of flame; secondly, a peculiar spot alternating between the temperatures of the tropics and the pole at the right rear, where the ice-cold entering gas freezes the neighbourhood once in each cycle, and the nucleus of a hell-burst of detonation almost melts the sparking plug a fraction of a second later; thirdly, a comparatively temperate zone, occupying the whole of the rest of the combustion chamber.

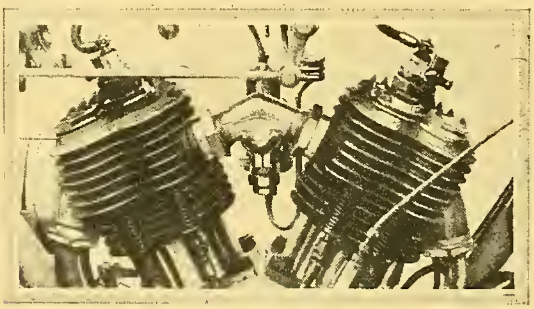


Fig. 3.—Present-day type of side valve cylinders, valve caps, and guides, showing their general "knobbiness."

Inequality of Surface in Combustion Heads.

The top of the cylinder is obviously the place where variations of temperature with their consequent warps and distortions are mostly to be feared (fig. 3). But this cylinder head, too, is a casting: a casting with all the inevitable inaccuracies of castings which are largely unmachined, and—worst of all—a casting which literally bristles with knobs and humps and lumps of metal, callously incorporated in it from sheer want of comprehension. The casting is so complex that only a photograph of a section made at umpteen points can give any notion of its glaring absurdities. But to name a few of the protuberances, we have a large boss bang in the centre of the head, which carries a dope hole, commonly known as a compression cock, because some of the compression is usually leaking through it. On the right rear and front we have two huge amorphous warp-producing blobs of metal known as valve caps, which will continue to singe asbestos for ten minutes after extraction from a hot engine. Beneath them are valve guides, which are usually well blued with heat over much of their surfaces after the first five minutes run of a new engine. The exhaust pipe, and its heavy connection, store up a lot of heat, and hot air from them blows back on to the rest of the long-enduring flank of the engine. The more we consider the warping possibilities of this monstrous abortion known as a combustion head the more we marvel that it retains any pretension of shape afte ten miles at 30 m.p.h.

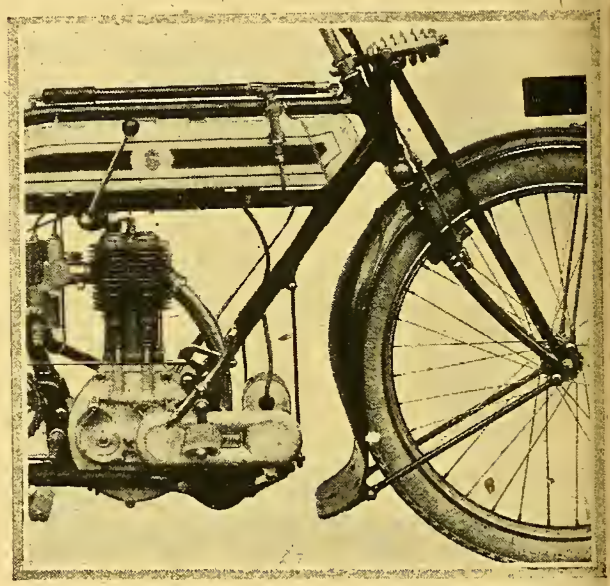


Fig. 4.—The 3½ h.p. vertical single, illustrating the remarks on draught obstruction.

The Effect of Draught.

Moreover, in the preliminary study above, we pretended that the draught on the entire periphery of th cylinder was even. As a matter of fact, it is impossible that this draught should ever approach evenness, however distantly. To begin with, we cannot b certain that there will be any draught at all, for th machine may be travelling at 30 m.p.h. with a 3 m.p.h. wind dead astern. Secondly, we cannot gues

Air-cooling.—

from what direction the draught, if any, will be coming, for the machine travels along the ever-changing line of the road, and the wind does not adjust itself to the route we have mapped. Thirdly, an unknown percentage of the draught will be diverted before it reaches the cylinder; immediately in front of the cylinder there are various bulky fittings, to wit, an exhaust pipe, a magneto, at least five steel tubes (front down tube of frame, two fork tubes, and two fork girders), a mudguard almost as wide as the cylinder, a revolving wheel causing the most intricate atmospheric disturbances which vary eternally with wind speeds and wind angles, a tangle of control wires, support stays, a mudsplasher, etc., etc. Fourthly, the draught (if any) bounces off the irregular surfaces of that face of the cylinder which it hits, and jumps past the sides of the cylinder, missing its remoter face altogether (fig. 4).

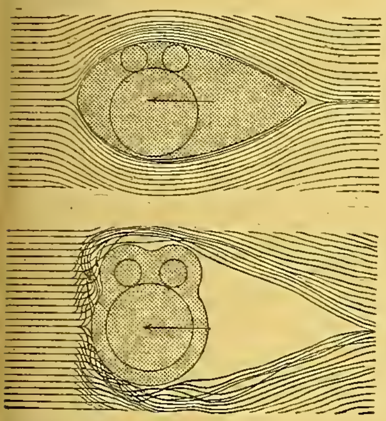


Fig. 5.—Diagrams depicting the behaviour of draughts on a stream-line cylinder head and on a side valve cylinder head. In the second sketch, note the vacuum behind the engine and failure of draught to reach the rear head.

In other words, when there is a draught at all, an unknown percentage of that draught impinges on the nearest face of the cylinder, and the remoter face of the cylinder receives no draught at all.

Improving the Cooling by Better Design.

Summing up the result of these investigations, we note down two or three items of a comforting character:

1. It should be possible to reduce distortion by redesigning the cast iron cylinder and head.
2. It should be possible to eliminate the troubles arising from the failure of inefficient sparking plugs to withstand high temperatures.
3. Aluminium pistons and cylinders should help in conducting away heat from the combustion chamber: and this will alleviate annoying carbonisation troubles.

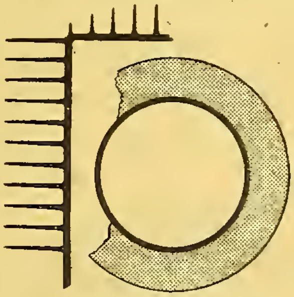


Fig. 6.—Sections of accurately-machined steel cylinders.

4. It should be possible to conduct cooling draughts over that face of the cylinder which is remote from the draught.

The diagrams illustrate in outline the kind of way in which these points might be attained.

Fig. 5 shows the plan of a streamline radiating fin. This would be no more efficient than existing types, except when the draught was head-on. As a rule, the draught is along the centre line of the machine: and in this instance the rear of the cylinder would be cooled.

The Steel Cylinder.

Fig. 6 shows a section of cylinder wall machined from steel, and shows that the wall can be of even thickness throughout. This type of cylinder has already been applied to a spring frame, four-speeded machine—the A.B.C.

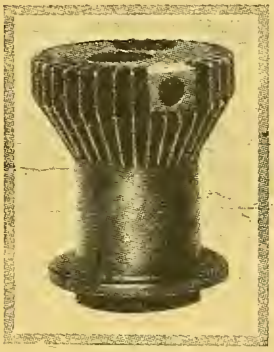


Fig. 8.—The steel cylinder, as fitted to the A.B.C. flat twin engine.

Fig. 7 is the plan of a detachable cylinder head, free from any warping side pockets. Two small exhaust valves are placed in the front or best-cooled area of the head: one (larger) inlet valve is located in the rear, or hotter area: the result would be that the fore and after temperatures would be normalised. All three valves could be operated from a cam gear placed at either side of the engine, in front, or at the rear, as the designer might prefer. The cross-section of the cylinder, with these overhead valves, would be circular from its base to its head, and no lob-sided wrenching effect would be present. No valve fractures would be experienced, provided suitable steels were employed, as aero engine practice has amply proved.

Machining the Combustion Head.

The combustion head, like the cylinder, could be machined inside and out. The valve pockets would be bolted to it.

These alterations are not radical. Radical changes were never necessary. The experience of millions of miles of touring, added to the records of Brooklands and the Isle of Man, prove that the pre-war motor cycle engine came within a very short distance of success. A few petty-looking improvements, designed to reduce warping, and to ensure an even temperature, would eliminate "konking" (the writer already possesses an engine which never "konks" or pre-ignites), and would exert a marvellous influence on the allied problems of lubrication and the sparking plug.

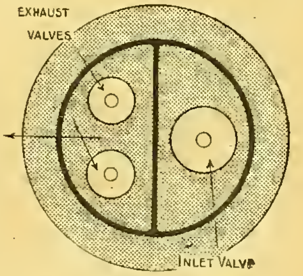


Fig. 7.—Plan of cylinder head (detachable), as described in text.

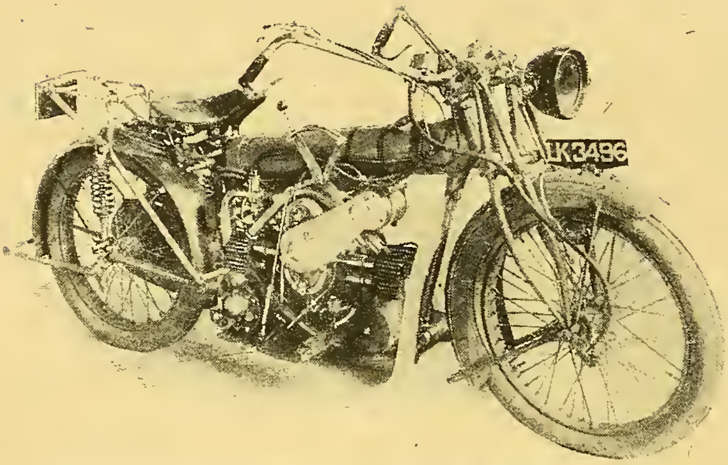
GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

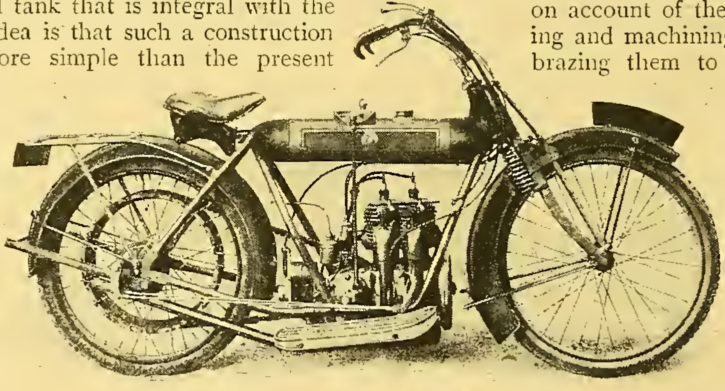
FRAMES EMBODYING THE TANKS.

A Method of Frame Construction not in General Favour, but possessing Several Commendable Features.



6 h.p. flat twin Matchless. One of the most recent designs of motor cycles. This machine possesses, among other unique features, a tubular tank as part of the frame, and in this particular case the system undoubtedly has advantages.

ALMOST every motor cyclist in detailing his ideal motor cycle or making a prophecy concerning the machine of the future includes in his specification a petrol tank that is integral with the frame. Generally the idea is that such a construction would be not only more simple than the present practice of attaching a separate tank to the frame tubes, but would render the cleaning operations much easier. Frequently it is claimed that a combined tank and frame is cheaper also, and sometimes surprise is expressed that more manufacturers have not given the idea more consideration.



A 1915 Premier two-stroke, utilising a large tube as the tank.

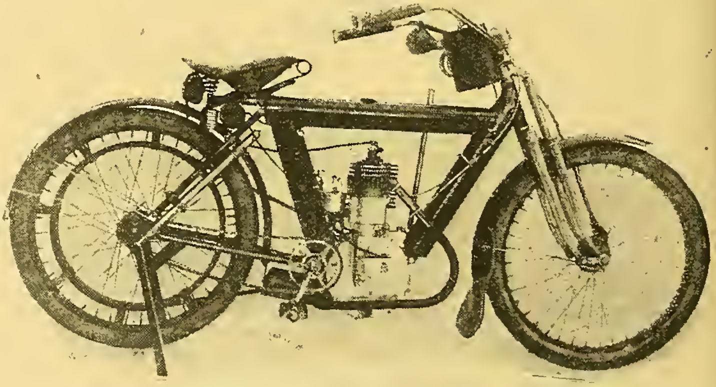
So far back as 1903 the frame tubes were used to carry the liquid fuel. This machine is illustrated on the following page, but even with the light consumption of the smallest modern lightweight one cannot imagine that sufficient fuel could be so carried to satisfy the present-day requirements, although, in normal times, petrol is obtainable every few miles.

Two American developments of this idea are also illustrated, but to the English mind they would appear to be straining the point, and not likely to be considered seriously on this side of the Atlantic. It may be remembered by some of the older readers of *The Motor Cycle* that in the Werner front-driven machine the mixture was taken from the surface carburetter in the tank through the head of the machine to the induction pipe of the engine, but since those days it has been the practice to keep the different units entirely separate, with the result that a modern motor cycle has almost as many parts as a car, but, unlike the car, every part is visible, and the novice on looking over a machine before he has decided to join the ranks of motor cyclists is struck by the apparent complication in comparison with a car number.

Probably it has been with a view to giving a machine a cleaner and simpler appearance that makers have experimented with tanks which are integral with the frames. In England the only adaptation of this general idea has been on recently designed machines, *i.e.*, the Matchless flat twin and the Premier two-stroke, in both of which the top tubes only have been used, and these have been enlarged to provide the necessary capacity.

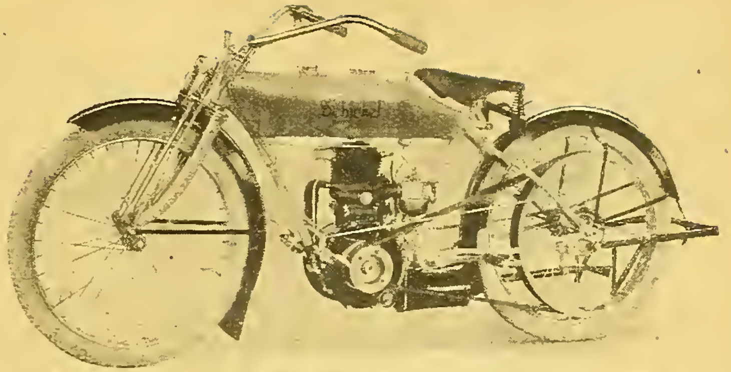
It is questionable, however, whether this form of construction will become very popular, as there appear to be very few manufacturing advantages. The total cost of such a frame is said to exceed that of a separate conventional frame and sheet metal tank on account of the greater expense of casting and machining the two end pieces and brazing them to the connecting tube of large diameter.

There is also a certain prejudice to be overcome. Designers appear to be of the opinion that any damage to the tank necessitates a new frame, while such small repairs as leakages would be inconvenient to undertake, as, instead of being able to detach the tank for transit to the makers or a neighbouring tinsmith, the complete machine would have to be sent, or the machine dismantled to enable the frame to be sent away.



A recent American design, the Osborne, in which the tubes of the frame are utilised for the carrying of petrol and oil.

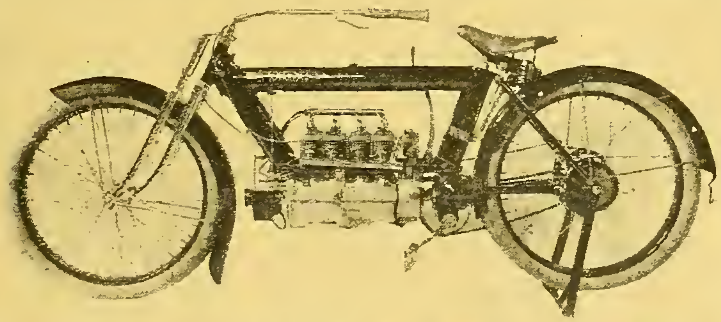
rames Embodying the Tanks.—



The Schickel tank of cast aluminium, to which the tubes are connected by means of sockets and clips.

Probably many of these prejudices are not ustified. For one reason, a tubular tank built is part of the frame is very strong, and a blow uch as will dent and burst a sheet metal tank would have no ill effect on such a tank as the Matchless, while any accident which did damage to an integral tank would, in any case, result in damage to the frame in whatever form t was constructed.

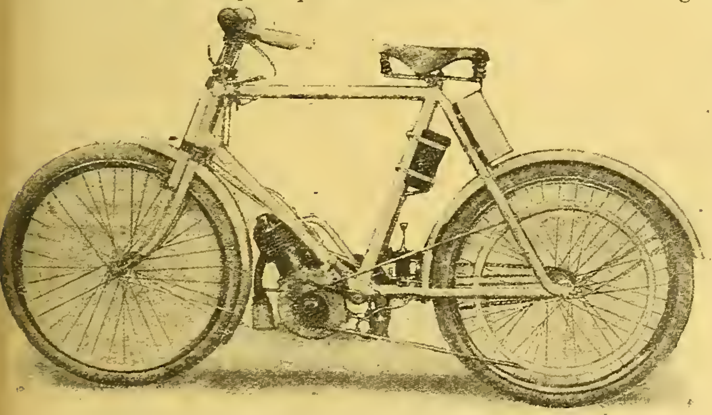
It is not unreasonable to suppose, however, hat the motor cycle of the future may embody ank and frame construction which has not yet been tried. Probably the sheet metal tank, as it is known to-day, will disappear, and in its place we may see the top part of the frame combining a tank stamped out of a single sheet of steel and welded together. I am told by the works' manager of a large Midland concern that, provided a manufacturer was prepared to concentrate upon one model to be produced in large quantities, such a method would be cheaper, stronger, and better-looking than anything yet attempted by British motor cycle makers. The war has taught several manufacturers many things connected with steel pressings, and welded units very much larger than a combined tank and frame are now being produced by men who, before the war, considered such work impossible.



The Pierce, one of the first of the American designs to use the tubes for carrying fuel.

The possibilities of pressed steel are well illustrated by the design of the Taunton light car—a British-designed proposition produced, just before the war, in Belgium. In this car the frame was one pressing, and embodied the bottom halves of the crank case and gear box. I believe, however, that at the time the Huns overran Belgium certain changes were about to be made because it was found that distortion took place and caused friction.

The engine and gear box of a motor cycle are a very different proposition from that of a car with 9ft. wheelbase, and it is quite possible that what caused distortion in a car frame would not do so on a motor cycle. It is easy to imagine two units of steel pressings, the top portion embodying the tank, head, and saddle fixings, and another combining the lower halves of the engine-gear unit; the connecting members we know now as the front frame tube and the "seat tube," the connections for the rear stays and supports for the rear springs, for such an ultra-modern frame would not be complete unless it were sprung.



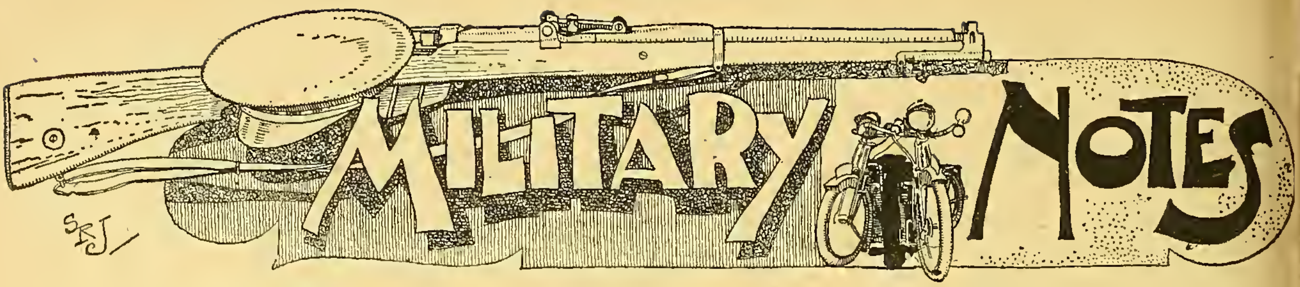
A 1903 British design on similar lines to the Osborne.

Such a machine would not appear to be so unorthodox as some of the designs suggested by pseudo-designers of "ideal" machines. This point of orthodoxy is important, as probably no people are so difficult to wean from the conventional as the British, who would be inclined to avoid such features as channel and U-sectioned framework. In appearance the machine built up as outlined would not depart very considerably from present-day designs: it would be in method rather than in appearance that the difference would lie.

For several years the Schickel American two-stroke motor cycle has had the top part of the frame, embodying the tank, cast in aluminium in one piece. The difficulty with this form of construction hitherto has been in forming a sound joint between the steel tubes and the aluminium sockets; but the increased knowledge of aluminium alloys and methods of working them derived from war work may be the means of overcoming these difficulties, although with aluminium at its present price—and we are told it will remain high for many years to come—the chances of its being used extensively in frame design would appear remote.

Extremists will tell us that in the motor cycle of the future such materials as reinforced concrete and *papier mâché* are not outside the range of possibility for tank construction—two extremes hardly promising of realisation.

VEDETTE.



Running the Gauntlet. Reminiscences from Salonica.

MENTIONED IN DESPATCHES.

WE are very glad to see the name of Col. A. E. Davidson, D.S.O., R.E., a vice-president of the A.C.U., in a list of officers mentioned in despatches by Field-Marshal Sir Douglas Haig.

MOTOR CYCLES IN SALONICA.

SOME idea of the conditions prevailing in Salonica in February of this year, and again in the early part of April, may be gathered from the accompanying photographs which have reached us from a Corporal, R.E. He writes home: "These snaps will give you ocular proof of some statements I made. I will leave it to you to imagine what it is like going through these roads in the dark with the rain pouring down in torrents, miles and miles of mud ahead, and the uncertainty as to whether one's magneto will stick it."

NEWS FROM AN OLD READER.

WE were pleased to hear from Cpl. C. T. Ringham, R.E., the other day, who, before the war, was one of the motor cycle experts of the Service Co., Ltd. He writes: "I was glad to see your paragraph in *The Motor Cycle* concerning my old business colleague, Sapper Flint. I had lost touch with him for over a year, and am glad to see he is, like myself, in England. I have just had four months in hospital, having been invalided home after the Cambrai 'do.' As a brigade D.R. I hardly had what you would call a "cushy" time there, and when my Triumph was riddled with shrapnel I was turned out with the neighbouring brigade D.R.'s to help the infantry. I get the 'Blue 'Un' all right, although a bit irregularly, and always look forward to it."

RUNNING THE GAUNTLET.

THE Distinguished Conduct Medal has been awarded to Cpl. H. Davy, D.R., R.E. The *Gazette* says that when the enemy entered a village Davy volunteered to try and get through with an urgent message. He rushed through the enemy who were holding the cross roads, although machine guns were turned on him. He was then chased down the road by two enemy aeroplanes, but got away on his motor cycle and delivered his message.

OLD-TIME REMINISCENCES.

WE recently had an interesting letter from Tom Woodman, who is now in the R.A.F. serving in Salonica. He was recently bet by a fellow motor cyclist, who should have known better, that the F.N. factory had never turned out a 3½ h.p. engine. We were, fortunately, able to help Woodman to win this bet, by sending him documentary evidence to prove that he was right.

Woodman is an old-time motor cyclist who rode in a good many of the important competitions in the early days, and some of his reminiscences are quite interesting. He writes: "It is really remarkable how little is known of the early days of motoring, yet from what on has to listen to at times it woul appear that some of the fellows would b anything from two to ten years of ag when they owned their first 5-6 h.p. two cylinder Vindec, N.S.U., or other mak of machine. A man who is twenty-tw years of age would try to convince m that he had owned one of the first Bats Others must have been enthusiasti owners of motor cycles at any tim between 1875 and 1885. If you will loo up your records you will find that I wa one of the triple winners of the Stock trophy in 1905. The same year I did th London-Edinburgh on a 3½ h.p. Vindec The six days trials of that year I wen through on a 2¾ h.p. Vindec, also winnin the appearance prize. In 1906 I was o a 5-6 h.p. Vindec, and in 1907 I had really special 3½ h.p. Vindec with automatic inlet valves, which was really th King of the Road for all-round satisfaction in the way of speed and reliability Billy Wells will remember the machin quite well. The engine was a Peugeo and had the 5 h.p. flywheels and cran case. As regards earlier history, I rod a 1¼ h.p. De Dion tricycle in 1900, an the same year I met Tessier at som sports at Blankney, Lincs., and he wa on what was then called a 1¼ h.p Werner. I remember it quite well as I owned one a bit later. It ha tube ignition, petrol in the fron mudguard, which one had to blow u with a cycle pump to force the petro to the fire-box. A match was the used on the fire-box, and one hope that the jet would not becom blocked."

Despatch riders in Salonica during the winter time have "road" conditions to contend with of a nature little realised by some people. The picture on the right tells its own story.

EASY STARTING

OF THE

ARIEL

MOTOR CYCLE

The easy starting of the Ariel is specially mentioned in nearly every letter we receive from owners. The following are a few extracts selected at random.

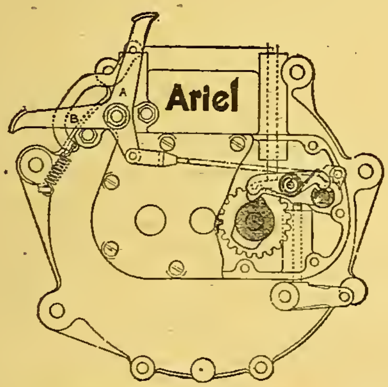
"Even on to-day's so-called petrol, mine starts at first kick."—W. D. W., Redbourne.

"The other night the bike was left out from 12 a.m. till 8 a.m. in a perfect rain storm. When I got to her in the morning she started up with the first kick."—
Dr. G. H., Shetland.

"It is easy starting and most powerful on hills."—B. S. W., Stowmarket.

"I find the easy starting a great comfort."
—Dr. D. M. H., Bolton.

"The easy starting decompressor is a revelation."—A. B., Ulverston.



The Ariel (Patent) Decompressor.

A simple mechanical device—absolutely positive in action—nothing to get out of order. To bring the decompressor into operation the front lever (A) is placed in the forward position, and the rear lever (B) pressed down to bring the engine under full compression.

Art Catalogue post free from—

ARIEL WORKS, Ltd., 3, Bournbrook, BIRMINGHAM.

The Survival of the Fittest

NATURE'S scheme does not allow for the inefficient. The weakest go to the wall. It is only Quality that counts. Quality of muscle, bone, and brain.

Similarly, the great world of Commerce has no use for poor quality. Only the best is wanted. Others may endure for a time, but the "real thing" inevitably triumphs.

Wood-Milne Motor Cycle Tyres

have forced their way to the front by sheer merit. The Quality of "Strength" is there, and the Quality of "Brain" behind their manufacture.

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21, ALBION STREET, GAYTHORN, MANCHESTER.
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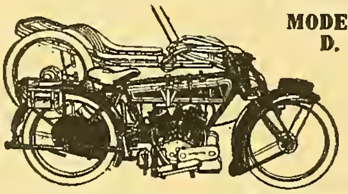
BRITISH MOTOR AND ALLIED MANUFACTURERS ASSOCIATION OF

is an indication that this Firm has been accepted as genuinely British by a Tribunal of Trade Competitors.



MODEL D.

PRE-EMINENT POINTS

"DURABILITY."

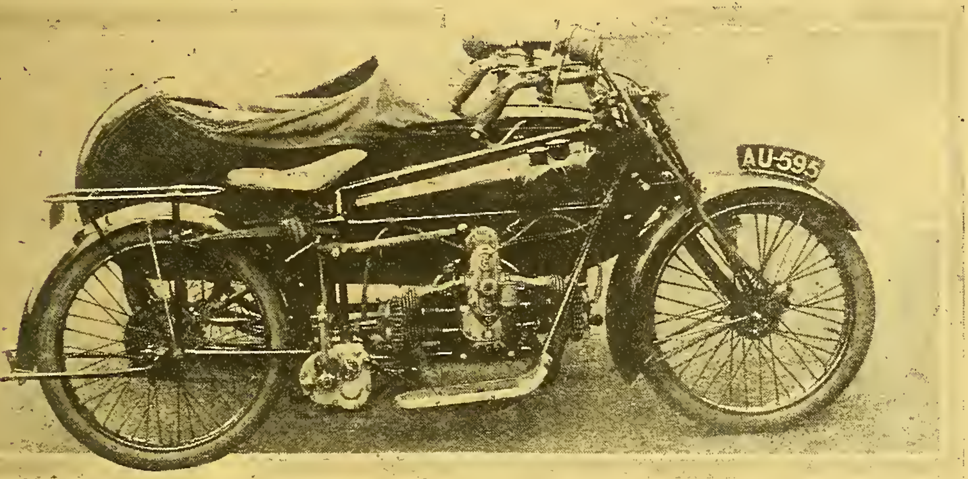
Undeterred by stress of weather, road, or prolonged use, the A.J.S. sets no limits to the "staying" potentialities in a motor cycle, and though amply verified by examples too numerous to enumerate, the testimony of one of "the many men who own one" sufficiently carries conviction

Owing to our being fully engaged on supplying Government requirements, we regret our inability to accept orders for delivery at present, but suggest that you place your name on our "Waiting List" for our earliest possible attention.

A. J. STEVENS & CO. (1914), Ltd.,
GRAISELEY HOUSE, WOLVERHAMPTON.
London Agents—H. TAYLOR & CO., Ltd., Store St., Tottenham Court Rd.

THE POST-WAR RALEIGH MOTOR CYCLE.

A Double-purpose Flat Twin of 654 c.c. Three-speed Gear and Rear Springing.



Side view of the first model of the Raleigh twin, which has been running on the road for some time past. Note the double tube frame and laminated rear springing, general neat appearance, and good lines, which are further improved in the later models.

AS we owned a Raleigh motor cycle upwards of twelve years ago, and rode it with very great satisfaction, t was with the expectation of seeing omething unusually good that we ourneyed to Nottingham last week to nspect the preliminary model of the ost-war Raleigh, and we were not disppointed. Let us say by way of preface hat we are heartily glad to welcome his well-known firm back again into he ranks of motor cycle makers.

The space at our disposal is not suffiient to do full justice to this interesting machine (which has been designed hroughout by Mr. William Comery, hief engineer and works manager of the Raleigh Co.) in the present issue, but we hope to refer to it again shortly. The preliminary model has been on the road ince April, 1917, so it has had a very horough testing, and has acquitted itself n a most satisfactory manner.

The Engine.

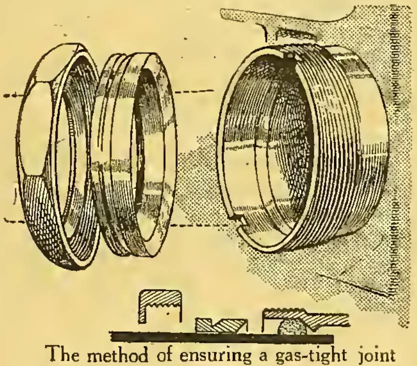
Naturally, our detailed description commences with the power unit. This takes the form of a flat twin of 77 mm. bore × 70 mm. stroke—decidedly a short stroke engine, a form of construction which seems particularly desirable in the case of a flat twin—a type of engine which is by nature rather lengthy. The present engine has a solid crankshaft, over which the roller bearing big ends are threaded, but a built-up shaft of very special design—a beautiful piece of work which we are not now at liberty to describe in detail—has been produced for subsequent machines. We do not think that we are betraying any confidence by saying that the construction is such that when the first model was assembled by hand and tested in a lathe it was found to be absolutely true. It is provided, moreover, with very adequate balance weights, with the object of overcoming the unbalanced couple which is present in every flat twin having a two-throw crankshaft.

The gudgeon pins are secured in the connecting rods, and rock in bushes fitted to the pistons, which are provided with two rings and an oil groove.

Lubrication.

The engine is supplied with oil by means of a drip feed, though it is likely that this will be superseded later on by a mechanical system, which will supply the proper proportion of oil to every part without relying upon splash or oil fog in the crank case. To ensure the front cylinder getting its proper supply of oil—always a consideration both in flat and V twins—the crank case is divided by means of a web, and the oil fed into that side in which the big end of the front cylinder dips; thence it overflows to the other side, and supplies the rear cylinder. Thus the front cylinder gets the first call on any oil in the crank case. Experiments in drilling this web, however, have shown that the lubrication is remarkably equal in the Raleigh engine, even when an equal level is allowed on each side.

An unusual feature of the Raleigh engine, which has already been referred to in the pages of *The Motor Cycle,* is that the carburetter is bolted directly on to the timing case cover, and the mixture is thus warmed at the beginning of its entry into the engine. Moreover, the crank case release valve is made by cutting ports in the pinion which drives the magneto; the ports open at the proper intervals and allow the warm air from the crank case to pass around the induction pipe with excellent results, and the air being taken into the engine cold is not expanded prior to its entry; thus the engine gets a fuller charge than would otherwise be the case.



The method of ensuring a gas-tight joint at the inlet pipe connections. The pipe is plain and has no flanges, and the ring of asbestos string is gripped tightly between two sloping surfaces and effectively seals the joint.

The Induction System.

Where the inlet pipe leaves the timing case the gas-tight joint is made by means of asbestos string and a brass gland secured by a lock-nut; this admits of expansion by heat without the joint being affected. Easy removal of the gland is attained by slotting the ends of the stub pipes and turning a groove in the gland, by means of which it can be taken out with a small tool or the point of a nail. The exhaust pipe is flanged and held in place by a detachable wire and lock-nut.

The valves are side by side and work parallel to the cylinder bore. Each valve is fitted with two springs—a method which allows less spring tension and at the same time no bouncing or chatter of valves, owing to the periodic vibration of the two springs being different.

The sparking plugs in the experimental engine are fitted into the inlet valve caps, but in the later models will be placed at an angle between the valves. This will enable the valve caps to be interchangeable. A plug has never been known to burn out on this engine.

Both inlet and exhaust ports are nicely curved to ensure an easy flow of gases.

The cylinders, which have detachable heads, are held in place by long bolts, one on each side, and a bridge piece. The bolts are hinged where they join the crank case. Thus when one nut is loosened they can be folded in either direction, for the bridge piece is slotted at one side, and the cylinder removed.

The Post-war Raleigh Motor Cycle.—
The bridge piece has a steel ball in its centre, which bears upon the centre of the cylinder and holds the whole in position with a perfectly even pressure. This arrangement makes the quick removal of the cylinders a very easy matter, the nuts being readily accessible.

A shock absorber is provided on the engine-shaft, the details of which are not yet available. In future models the sprocket will be outside the 12in. flywheel. This simplifies the fitting of a chain cover and makes the engine very compact. The experimental engine has an extra stay from the crank case to one of the tubes below the tank.

The Spring Frame.

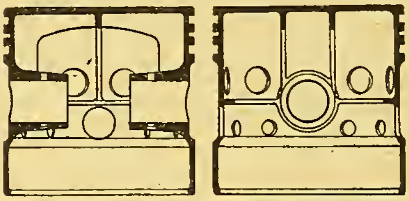
The frame is of double straight tubes throughout, with the single exception of the tube above the tank, which slopes downwards from the head to the seat-pillar. The rear springing is most effectively carried out by means of laminated springs attached to lugs which are extensions of the twin tubes running from the front of the frame. The carrier is not sprung, but the toolbox will be carried on the sprung part of the frame below the rear part of the tank. The front forks are the latest pattern Brampton, designed to meet vertical and horizontal shocks. The down tubes spread out from the head and straddle the front cylinder.

Wide mudguards are fitted, the forks passing through the front mudguards. The holes through which they pass are, however, entirely covered with adequate mud traps. An important point—one, moreover, often neglected.

The head lug is reinforced from top to bottom; a lubricator is provided halfway up for the injection of grease, and the upper ball caps are made to overlap the lower with the object of keeping all dust and dirt out of the bearings.

Detachable Wheels.

Not only are the wheels detachable from the frame, but the hubs are themselves detachable from the wheels in a very simple and effective manner. The removal of the central bolt allows the hub to be unscrewed from the driving and brake mechanism, which in the case of the rear wheel remains *in situ*. When in position the driving mechanism is very firmly attached to the wheel by means of screwed-up cones, and further is prevented from revolving separately by pegs. This method obviates any possibility of backlash, so destructive to tyres, transmission, and engine.



Two sections of the Raleigh piston. There are two rings at the top with an oil groove between, three cross webs inside the head, and the skirt drilled to assist lubrication and reduce weight.

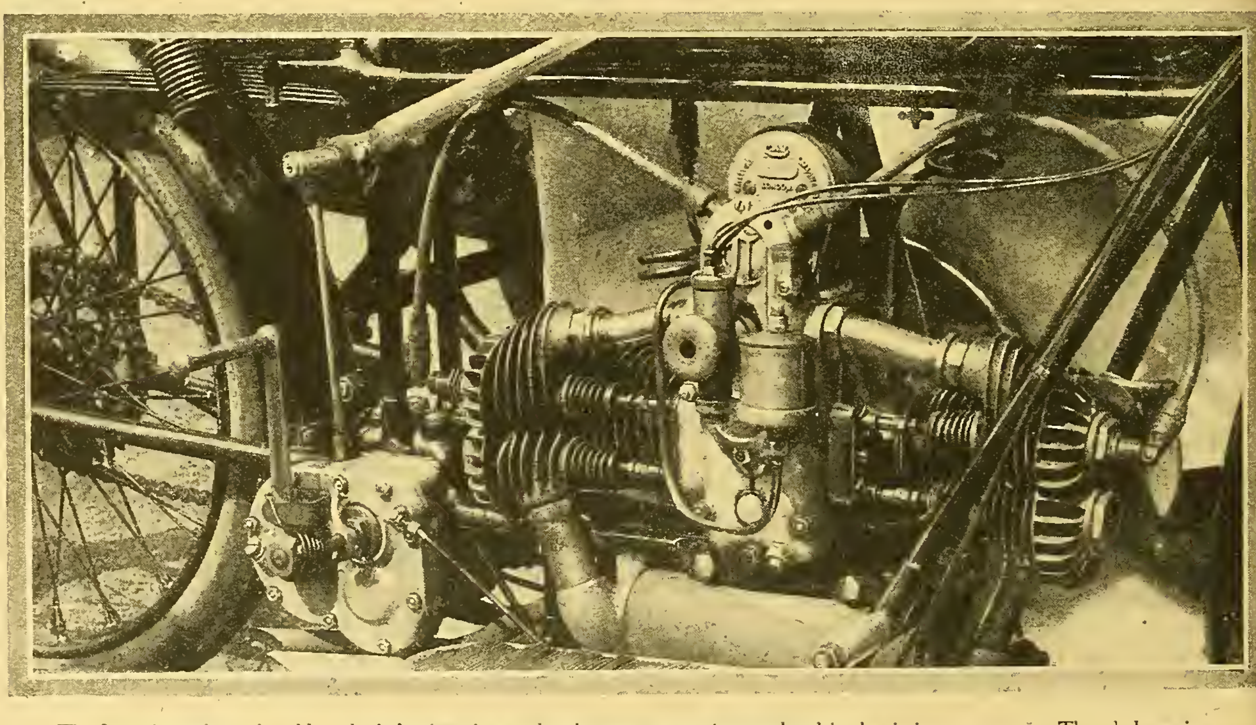
The rear brake is an expanding drum operated by the left heel. The front brake works inside the V of a dummy belt rim spoked to the hub, and removable in the manner just described, though the front wheel can be taken out with the brake rim in position if so desired. The hubs have large ball races and are very adequately protected from dirt, and the outside dust caps used as a means of locking the mechanism when screwed up. Lubrication is supplied by a grease gun through the hollow cent bolt—a much more convenient meth than an oil cup between the spokes.

Transmission.

The engine power is transmitted to t Sturmey-Archer three-speed gear box the countershaft, and thence to the re wheel by chains. The clutch is op ated from the handle-bar, but may arranged for a combined hand and fo control. The gear lever is convenient placed for the right hand, the controlli springs being on the lever instead of the gear box—a position which remov them farther from the deleterious effec of mud. On the later models the lev will be provided with a gate on the si of the tank, so arranged that it will possible to change instantaneously eith up or down to middle in the dark.

The tank tapers from front to rea and is of very sensible dimensions; lar filler caps are fitted. Other items a C.A.V. magneto, Amac carburetter, ar Dunlop (650×65 mm.) grooved tyre The ribs of the rear wheel tyre are ju worn off in 4.000 miles running, almo entirely with a heavy sidecar attache but the other tyres show very slig signs of wear—a result which speaks we for the transmission. Petrol consum tion is said to be about 80 m.p.g. so and 70 m.p.g. with sidecar. The weig of the complete machine, viz., 240 with a full tank, speedometer, etc., com pares favourably with that of oth machines of similar or even less powe and the machine, having a high clea ance and spring frame, should prove ve suitable for use Overseas.

We are asked to mention that the pri has not yet been fixed, nor can delive dates be quoted. Intending purchasers—and, doubtless, there will be many—mu therefore possess their souls in patience.



The flat twin engine unit. Note the induction pipes and carburetter connections enclosed in the timing case cover. The whole engine unit has a forward or backward movement for adjusting the driving chain, the gear box being a fixture in the frame.

CURRENT CHAT

Times to Light Lamps.

Summer Time.

May 30th	9.32 p.m.
June 1st	9.35 ,,
,, 3rd	9.37 ,,
,, 5th	9.39 ,,

Motor Cycles for the U.S.A. Army.

For carrying on the war, the U.S.A. Government has purchased 3,520 passenger automobiles and 6,126 motor cycles. This will clearly show how greatly the motor cycle is valued by the army of our newest Ally.

Sidecars on War Work.

More and more motor cycles and sidecars are being pressed into service by Government Departments, but still quite a lot of high-powered cars are to be seen transporting officers about when motor sidecars could easily perform such a service with infinitely greater economy.

The American Bosch Works.

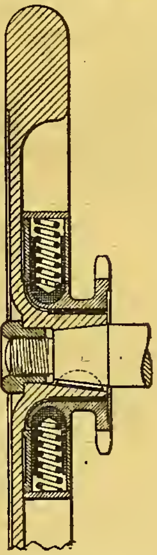
The American Government has recently seized the plant and works of the Bosch Magneto Co. as alien-owned property. According to English precedent, the works will be kept running as usual under the supervision of a Government-appointed management.

Some Output.

In view of recent remarks that have appeared in *The Motor Cycle* on the possibilities and probabilities of the English magneto trade after the war, it is of interest to know that the output of the American Bosch works is 150,000 magnetos per annum.

Raleigh Patents.

In a recent issue we gave particulars of two important patents granted to the Raleigh Co. These were for a flat twin engine and a four-speed gear box, which revealed the fact that the famous cycle concern was again interested in motor cycles. In this issue we are able to give a description of the completed Raleigh machine, while on this page we print two other inventions patented by this company.



Cross section of the Raleigh patent shock absorber and flywheel.

War-time Measures.

Our trade contemporary, *Bicycling News*—incidentally, the oldest cycling paper in the world—is now issued in a convenient pocket form, about 11in. × 4in., as a temporary war economy measure.

The Suggested Black List of Motorists.

What do readers think of this ridiculous scheme, recently criticised in *The Autocar?* One of the most delightful jokes of the war, it is worth reading about, and we much regret that at present we have no space to devote to the ludicrous.

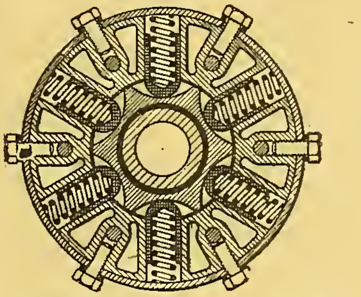
The R.O. and the M.C.

A recruit recently went before various recruiting officers in order to join as motor mechanic in the R.A.F.—a branch for which he was well qualified as an experienced man. He was finally referred to the head recruiting office in a large Northern town, some twenty miles from his home, and the officer-in-charge recommended him to apply to *The Motor Cycle.* The man has visited all told some four recruiting offices, separated on an average twenty miles apart, and he finished up in the infantry.

The Luxury Tax.

The Select Committee on Luxury Duty has received from the Automobile Association a vigorous protest concerning the proposed taxation of motor vehicles as luxuries. It is contended that vehicles used for national, business, or other urgent purposes cannot be regarded as luxuries. Luxury motoring does not exist, and a tax on motor cycles or cars would cause unmerited hardship and a considerable increase in the already heavy burden of taxation borne by motorists.

The Automobile Association has been informed that the views embodied in the protest will be placed before the Select Committee when they consider the application of the duty to motor vehicles.



The shock absorber patented by the Raleigh Co., embodying spring-loaded plungers in concave recesses.

Special Features.

THE POST-WAR RALEIGH FLAT TWIN.

AIR-COOLING.

FRAMES EMBODYING THE TANK.

Oil in Egypt.

According to a reply to a recent question in the House, it would appear that the development of oil fields in Egypt is proceeding satisfactorily. At present the work is in the hands of a private company working under Government approval and assistance.

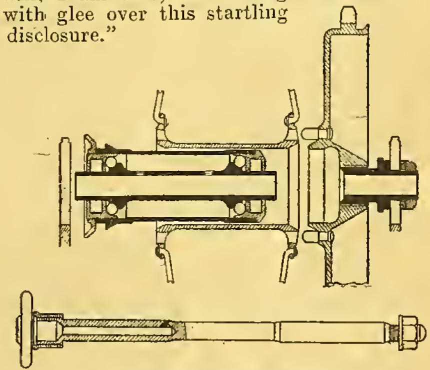
From Passenger Work to Solo Riding.

We have recently had a long spell on a solo 'bus, after some years of passenger machine work. To our mind, the most noticeable feature of the single-tracker is its marked economy. The belt, which fell off in protest the other day, resembled a piece of rope; the canvas was everywhere exposed and in two places was practically broken through. In this condition it had given 2,000 miles of service and undoubtedly it would not have stood up to fifty miles of sidecar work. Moreover, tyres seem to possess everlasting wear.

The Doom of the Single Cylinder.

An R.A.F. sergeant sends us a cutting from one of the cheap illustrated dailies. The paragraph reads as follows: "A big two-cylinder Gotha raider got into difficulties, and sent out rockets and signals. Eventually the machine crashed in a field about four miles away. Six bombs were dropped in the field, doing no damage."

"After this latest achievement in German aeroplane engine manufacture," writes the sergeant, "there is no doubt that the single-cylinder will soon become obsolete. The twin-cylinder enthusiasts will, I am sure, be rubbing their hands with glee over this startling disclosure."



The Raleigh patent detachable wheel which, in some respects, is reminiscent of car practice.

Control of Horse Transport.

Horses have long been rationed, and now their services are being officially controlled. Moreover, not only is the purchase of horses coming under official supervision, but so is their *sale*.

Among the Classics.

A reader recently came across a list of second-hand books, in which "Motor Cycles and How to Manage Them" (published from these offices) was sandwiched between "Pilgrim's Progress" and "Gulliver's Travels."

Cams.

It is said that G. E. Stanley carried his racing cams in his waistcoat pocket. The camshaft of a modern aeroplane engine is somewhat larger—in fact, several feet long—and no man would care to carry it far, even across his shoulder.

Our Contemporaries.

The *Scottish Cyclist and Motor Cyclist*, which enjoyed a considerable popularity this side the Tweed, has been absorbed into its parent journal *The Motor World* as a war economy measure, *i.e.*, in paper-saving.

Another contemporary, *Bicycling News*, which is entirely a trade paper, has adopted a novel shape as a means to economy. Normally this paper is about the same size as *The Motor Cycle;* now the size of its front cover is reduced by about half, the division being made along a vertical line!

Airmen Motor Cyclists.

It is interesting to note that the following famous American airmen graduated as motor cyclists: The Wright Brothers, Glenn Curtis (who first gained prominence as a motor cycle racing man), Lincoln Beachey, Glenn L. Martin, and Art Smith.

On the application form for enlistment into any branch of the United States Aero Service the following questions appear: "Are you a motor cyclist? Do you understand the care, operation, and repair of motor cycles and motor cycle motors?" The questions asked clearly indicate that the Government consider that motor cycle-trained applicants are specially qualified for the Aero Service.

Scenes of Yore and Roads of To-day.

On a hurried scamper back to Town from a Kentish aerodrome the other day we passed through some country happily familiar in pre-war days. The rolling green hills still smile, and the fields are ablaze with wild flowers, though we are not there to look at them. The roads are given utterly over to the casual drover and his somnambulistic horse. When peace comes we shall have to teach him the rule of the road all over again! Near Oxted we met a young officer on a 3 h.p. Enfield unashamedly sporting a demure damsel on the carrier! We raised a shocked hand, in the manner of Mr. George Robey, and he grinned back at us. After that we "encountered" (the word is used advisedly) the Caterham Road, and what that highway has left of our machine we mean to go over shortly for lost nuts. It would require the vocabulary of a Capt. Kettle to do justice to such surface!

A Solution of the Petrol Difficulty?

A member of our staff says he has found it at last—the four-legged remedy, he calls it. He may be seen most evenings trotting round the lanes of the village in which he lives, but if you talk to him he says pathetically, "Well, I must get out somehow, but what *are* we coming to?"

An Excuse for Riding.

Readers who are not members of the "National Motor Cyclists' Fuel Union," but would like to use their machines all the same, might well consider the wisdom of offering their services to the local Volunteer Force. These organisations are often in need of transport to ranges and manœuvring grounds, and offers of help are generally welcomed.

A Gordon-Bennett Story.

To the late Mr. Gordon-Bennett's achievements must be added that of being one of the first to get the full measure of the Kaiser, and to announce publicly this measure not only to the world at large, but also to the prize Hun himself. Twenty years ago Mr. Bennett refused the Kaiser's invitation to dinner, and also the support of the *New York Herald*, and he followed this rebuff by proclaiming the Kaiser "a permanent menace to the peace of Europe."

Motor Cycling Footwear.

When will somebody design us a really waterproof boot? At this season of the year one may run into some very nasty little storms; but who wants to be encumbered with Hutchinsons? Water creeps into the laceholes, the thin leather of the tongue is soon sodden, you feel an oozing round your toes, and the next stage is quinine and eucalyptus! Surely it would be possible to design some kind of foot gear which, if kept decently dubbined, would afford adequate protection. Why not borrow a tip from our womenfolk, and have the laces running up the side?

What caused the Fire?

A 1916 Indian, owned by a Lee, S.E., ex-soldier, was almost destroyed by fire in the Old Kent Road the other afternoon, owing, it is said, to the petrol overflowing from the filler cap and running down the rider's coat, shorting the plug. Why shorting the plug should cause a conflagration it is difficult to say. The owner escaped injury.

Of Interest to Motor Cyclist Photographers.

Our publishers, Messrs. Iliffe and Sons Ltd., have acquired *The Amateur Photographer and Photographic News* and other photographic publications of Messrs. Hazell, Watson, and Viney, Ltd. During the war it is proposed to publish *The Amateur Photographer and Photographic News* with Messrs. Iliffes' other photographic paper, *Photography and Focus*, the combined journal embodying the leading characteristics of both publications.

Imports and Exports.

The value of imports of motor cycles, parts, and accessories for the month of April amounted to £6,228.

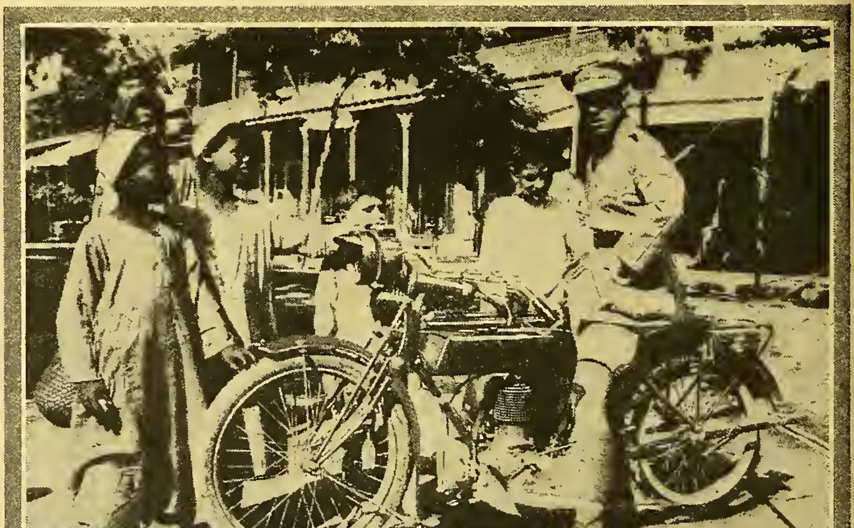
April Exports.

Compared with March, last month's exports showed an increase of £30,000. Against the figures for April, 1916, however, there is a decline of nearly £10,000.

	1916	1917	1918
Number of machines ..	626	984	559
Value of motor cycles, parts, etc.	£53,592	£72,824	£63,117

Magnetic Ignition.

In reporting particulars of the American Liberty motor cycle, *The Motor Age* (U.S.A.) refers to its "magnetic" ignition in both heading and context. In quoting the article for advertising purposes, the Bosch Co. of America draw a ring around "magnetic," and add "means magneto." Is the magneto disappearing so quickly over there that the motoring press have forgotten it, or has the war robbed the paper of its motoring staff?



A little group in Port Said. Interested native children around a D.R. astride a W.D. Triumph.

THE MOTOR CYCLE AVIATION SECTION

The enormous importance of the Air Service needs no emphasis; it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National Service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouragement of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

Castor Oil.

Now that the American aeroplanes are eckoned to be using 50,000 gallons of astor oil a day, perhaps Young Hopeful will be spared hearing mother say, "Now hut your eyes, dear, while mother gives you something to do you good!" Is there any section of the community that has not ome sympathetic interest in the aeroplane?

◇

Early Designs and their Origin.

Many of the early aeroplane designers ought inspiration from nature, often with disastrous effects. In 1897 Clement Ader designed a machine shaped startingly like a bat, the vanes of the propeller being, in fact, made of feathers. This craft did an elongated hop in the course of a military trial. (Ader, by the way, who was born out of his time, was he originator of those deadly little *léchettes*, steel arrows resembling a pencil. Dropped from 6,000 feet, these, before he advent of the steel helmet, would do deadly execution, and their light weight permitted thousands of them to be carried.)

Many of us will remember the dangerous Blériot "canard" of 1911, which flew tail first, and was indeed strongly reminiscent of a duck. The early Deperdussin machine resembled a hawk, the little 1912 Ponnier clipped-wing racer spun into the air like an infuriated bee, a resemblance heightened by its extreme compactness, and the Etrich monoplane (forerunner of the once terrible Taube), built in Austria in 1908, was copied from the zanonia leaf. At the other end of the scale was that amazing craft with circular planes, the Cedric Lee, so aptly christened "the Doughnut," which used to eddy uncertainly in the neighbourhood of Worthing, and which terminated its career in a magnificent series of unpremediated loops, the last of many vigorous attempts to kill its pilot, in which endeavour it happily failed!

A Remarkable Exploit of a Fighting Airman.

Fonck, the French airman, actually brought down six enemy aeroplanes in three hours on the 9th inst.

According to official accounts, Fonck used two machine guns arranged as a pair. It was at four o'clock in the afternoon, when on patrol, that this intrepid airman attacked a group of three enemy biplanes, of which two were fighting machines protecting an observation machine. The two fighting planes were shot down in ten seconds and crashed near Moreuil. The observation plane turned back, but its retreat was cut off five minutes later, and, the petrol tank being riddled, it fell in the same district in flames. The fight only occupied seven minutes, during which time Fonck fired about one hundred rounds.

He returned to the base, filled up with petrol and oil, and remarked that the three brought down undoubtedly belonged to the same squadron, that the commander would become anxious when they did not return, and would send out a patrol to look for them, "In which event," he said, "there is more work for me to do, and I am going up again." He gave a few orders, and at 6.30 p.m. went off with another patrol, which fell in with a biplane just over Montdidier. This was attacked and smashed up in the air. Then, while returning, he spotted two other enemy machines, and in less than five minutes nothing remained of them but two gigantic torches, which burned themselves out near to Havricourt.

His performance is equalled by the British aviator, Capt. Trollope, who, in the Somme battle on the 23rd of March, also brought down six machines, and was afterwards posted as missing. Capt. Ball is credited with five in one day; and the German airman, Von Richtofen, also accounted for five, although he paid the full penalty soon afterwards.

A Motor Cyclist Airman.

An old contributor to *The Motor Cycle*, the Rev. R. M. Bankes-Jones, who is now a lieutenant in the R.A.F., has left England for the Middle East. He writes: "I have been flying single-seated scouts for the last three months, and have been giving instruction on Avroes."

◇

Ramifications of the Aero Trade.

As an illustration of the way in which a trade can necessitate work in little-suspected directions, a statement in the *Evening Post* (N.Y.) takes some beating. It was there recently stated that one of the necessities of the aero trade was the planting of great acreages in India for the growth of the oil seed for motor lubrication!

◇

French Pilot's Deeds.

The celebrated French "Ace," Sec.-Lt. Guérin, whose squadron has just been strongly commended by the commanding officer for special services in the battle of Picardy, has been unfortunately wounded in the thigh by a machine gun bullet.

He has brought down seven enemy aeroplanes during his career, and his squadron is responsible for forty-seven aeroplanes and four balloons.

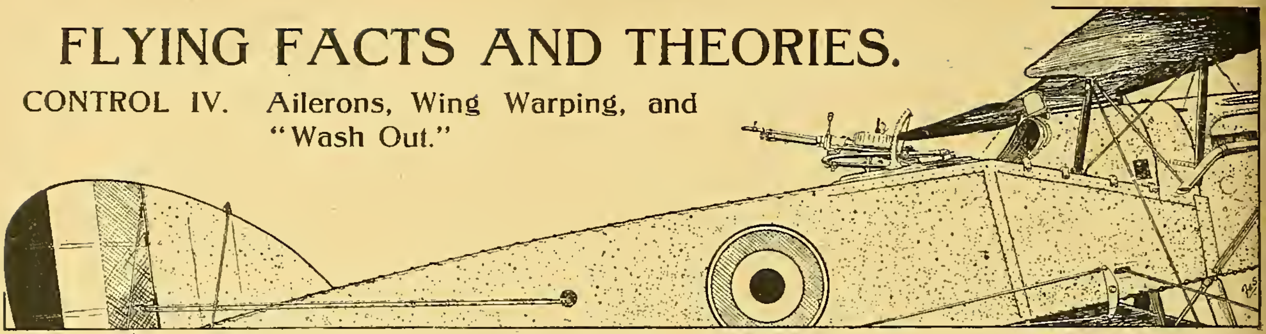
◇

Aero Ambulance.

Another interesting French novelty is the employment of a standard type of plane, with a slightly wider fuselage than usual, in which a bed is placed for a wounded passenger, who is strapped securely, and thoroughly screened by wind shields. Eighty miles an hour has been attained with these craft, which are plainly marked with the Red Cross insignia. On the face of it this might mean the saving of many a valuable life, the high speed and the absence of nerve-wracking jar being points in its favour.

FLYING FACTS AND THEORIES.

CONTROL IV. Ailerons, Wing Warping, and "Wash Out."



By W. G. ASTON, A.F.Ae.S., A.M.I.A.E.

THE object of the organs of lateral control, *i.e.*, flaps or wing-warping, is to enable the aeroplane to be rotated on its longitudinal axis so that, whenever required, it can be brought by the pilot on to an even keel, or, when turning, can be banked so as to obviate the tendency towards centrifugal side-slipping. With a stable machine there is, strictly speaking, no necessity for any lateral control, provided it be kept a reasonable altitude above the ground, as the inherent stability will automatically cause the machine to bank itself on a turn, and it will also equally automatically recover from the rolling effect of a gust. As, however, this recovery means inevitable loss of height, it is essential that the pilot have at his command means of adjusting the lateral trim of the aeroplane when near the ground. This control is also called for by variations in the engine torque, which artificially alter the loading on each wing and demand some form of adjustment in order that the machine may fly straight.

Wing Warping.

In the early days the majority of aeroplanes, especially monoplanes, were provided with a device whereby the wings could be helically "warped," that is to say, so that the angle of incidence of one tip could be increased whilst that at the other was decreased, as indicated in fig. 1, where A is the normal position of the plane, B that of one wing when warped, and C that of the other. Apart from any slight deformation of the wing section that may take place, it is clear that the only thing that varies is angle of incidence.

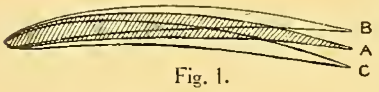


Fig. 1.

Nowadays control by means of flaps or ailerons is standard practice, and fig. 2 shows how, when these are brought into action, the effect on the whole plane section is not to produce a change of angle of incidence, but an alteration in camber. This is a preferable system in many ways. First of all, it is better from a structural point of view, since practically the whole of main planes can be made rigid; secondly, unlike the warping gear, the flaps can be "balanced" with a small part of their area projecting forward in front of the pivot, and so be made to demand less effort from the pilot in working them; and thirdly, they promote, generally, a smaller fore and aft movement of the centre of pressure, the result of which is that the wing spars can be placed closer together.

One considerable objection to wing warping is that it necessitates a deformation of the plane framework, which in turn can only take place provided there is a certain amount of "give" in the fabric. Needless to say, this is, from all other viewpoints, highly undesirable, as in the interests of lifting efficiency this fabric must be everywhere as tight as a drum.

Ailerons.

The ailerons are placed at the tips of the wings for the purpose of promoting the maximum turning effect about the fore and aft axis with the minimum effort on the part of the pilot. The smaller the angle through which they have to be moved for any given result the better, as, whether they are pulled up or down, if the angle is big, the drag of the plane as a whole is liable to be sensibly increased.

It is obvious that the effectiveness of the aileron must be considerably affected by the section of the plane which immediately precedes it, and which deflects the air in which the aileron is to work. For instance, if it is situated in the rear of a strongly-cambered section it is calculated to promote a bigger effect if it is pulled slightly "up" than if pulled slightly down, inasmuch as whereas in the former case it does not much alter the flow of air, in the latter case it alters it very materially. In order to enhance the effectiveness of ailerons, as well as for another object which will be mentioned later, it is common to find designers "washing out" the wing camber towards the wing tips; that is to say, the section is deepest at the centre and gradually flattens out towards the tips. The flatter the plane section in front of the ailerons, the more effective will they be, especially when controlled through small angles, and this is, of course, most desirable from the point of view of the pilot, who naturally desires to get the biggest effect with the smallest effort. It is not without interest to note, in passing, that in a similar way the fixed vertical fin very greatly increases the effectiveness of the rudder which is placed immediately behind it. It is as though the fixed plane acted as a guide whereby the deflecting influence of the rudder were greatly enhanced, just as when you hold an iron rod in a vice you only bend it gently if you pull on the extreme end of the rod, whereas you bend it very sharply if you pull on it close up to the vice. Now the object of

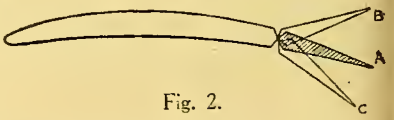


Fig. 2.

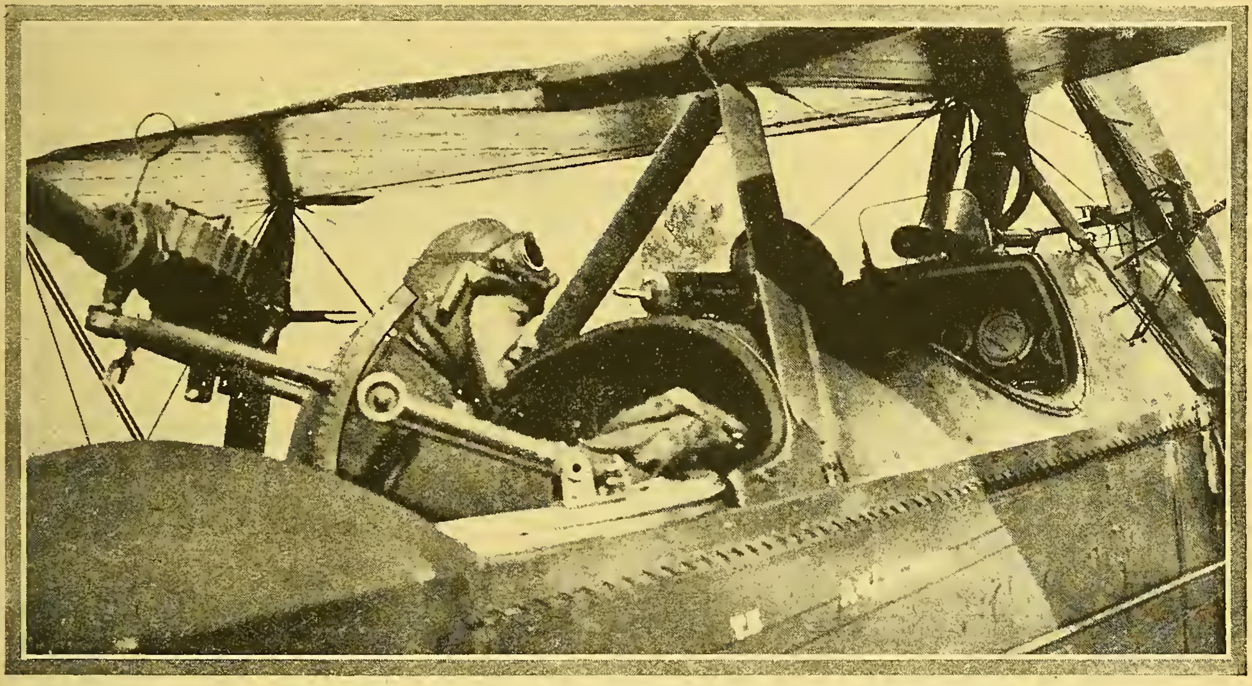
Flying Facts and Theories.—
ailerons, rudder, and elevators is to bend the air flow, and they will execute this work better, and therefore be lighter in construction and smaller in size, if they immediately follow a flat plane, or one of symmetrical curvature both top and bottom.

Variable Camber.

The idea of using flaps running from tip to tip of the main planes so that a variable camber effect could be given to the wings as a whole has been tried, but with no great measure of success. As I shall show in a later article, variable camber would be a most valuable device in widening the gap between the aeroplane's highest and lowest speeds.

In multiplanes it is not uncommon to find that the flaps are confined to the trailing edge of the top deck, though in perhaps the majority of present-day designs they are added to all the main surfaces and connected together either by rigid struts or wires. Generally speaking, the chord of the aileron is small in relation to its length, the ratio being somewhere in the neighbourhood of 1 to 6, and no object seems to be served by making it bigger.

The second advantage of the "wash out" mentioned above is this, that the maximum deflection of the air, which naturally occurs at the point of maximum angle of incidence, is surrounded by regions at which less deflection occurs, and so on until at the wing tips the deflection is very small indeed. This gradual process prevents the formation of power-wasting eddies and "surfaces of discontinuity."



An R.A.F. observer on the British Front in France with his wireless transmitter to keep in touch with our guns.

DAY AND NIGHT BOMBING.

THE average newspaper reader is encouraged to contrast the pluck of the British pilot who bombs Rhine towns in daylight with the cowardly Fritz, who only crosses the Channel by night. Nobody wishes to belittle the pluck of our pilots, and it is perfectly true that they run risks in bombing work which Fritz has never faced. But daylight bombing raids probably stand rather to the credit of the technical experts than to sheer pluck on the part of pilots. The long-distance bomber must obviously be quite differently designed for day and for night work. At night its chief protection is its invisibility: the anti-aircraft gunners will seldom sight it, even with the aid of searchlights, and defending fighter machines may hunt for it in vain. As a consequence it need neither fly high nor fast. The Gothas cannot get very high with their "eggs" on board, and their best speed is probably about 80 m.p.h. with full load. When screened by night, they are safe and formidable: but they have never ventured to come by day, since London was equipped with plenty of guns and defending scouts. If they came in broad daylight to-morrow, very few of them would reach the coast on their return journey. Hence our own daylight raids into Germany imply one of two things. Either the towns we attack are very imperfectly defended: and this is highly improbable, seeing that our bombing squadrons have to cross the front lines, traverse the aerodromes of the Hun fighter squadrons, and pass over dozens of his Archie batteries. Or else—and this seems to be the obvious explanation—we have a certain number of machines so immensely powerful that they do not rely upon invisibility for defence: they must be able to fly high and fast with their cargo of bombs on board, and must carry sufficient guns to put up a decent scrap with any scouts who try to intercept them. TORQUE.

THE EXPERIENCES OF A "HUN."

II.—Impressions of an Observer on controlling an Aeroplane for the First Time.

By "PITOT." (*Concluded from page 498.*)

First Duel.

THE sonorous roaring of the many engines early next morning rendered further slumber a remote possibility, and, with hands thrust deeply in pockets, I trudged through the dewy grass down to the sheds where the white planes glimmered in the beams of the rising sun. (N.B.—This is all rot really, the planes were a dirty brown, still——!) There was little wind; in fact, the weather was good—too good!

After kicking my heels for the usual period I shinned up into the nacelle, but this time in front of, and not behind, my instructor, who comforted me with the cheery remark that he would first do one or two circuits and then hand over the reins to me.

Keeping merely a light hand and foot on the respective controls, I felt convinced I should never be any good, when the time came, which it soon did. The machine at last sat placidly chewing the cud while the pilot prompted me for the last time; then "Now take her off," said he.

A timid paw advanced the throttle, the beast snorted and charged with a bellow from its exhaust. Tentative hands clutched the controls, and my fumbling feet pressed the rudder. *Mirabile dictu*, the bird rose slowly into the air and gradually ascended. A burst of confidence swept over the occupant of the front seat. "Well," I thought, "this isn't so bally diff——" A gloved hand waved suddenly in front of my face reminded me that even modern science had failed to produce an anti-toxin for "stalling." So I moved the "stick" hurriedly forward, and began to see-saw.

A second more vigorous wave reminded me of the fact that it was possible to turn—rapid messages from my brain made my shaking limbs perform their (more or less) correct functions, and behold! the machine lay on its side, swung its tail round behind its nose—and the first turn was *un fait accompli*.

One more hour's instruction, and I was pronounced to be ready for my "first solo."

A final "landing" was given, and the instructor clambered down to earth, leaving his pupil seated in the front and feeling, oh! *so* lonely.

"Now remember, just one circuit and land, no more," was his parting word.

Setting my teeth and placing my feet firmly on the pedals, I gave the throttle a hurried biff. The machine commenced its usual bull rush, promptly spun round, and stopped.

However, it was again placed into wind, and once more the engine roared. This time a straight course was maintained, and the machine rose.

"Now you *are* alone," was my inward comment—and I certainly felt more remote from the world than ever before, as the ground, with its hangars and huts, receded from view.

"About time you turned," was my next brain wave.

After a great screwing up of determination, the turn was accomplished with one eye glued to the Pitot tube.

Soon it was necessary to turn again, and, this second venture being accomplished, the aerodrome lay dead ahead.

"Shut off, and go down."

Only too pleased! Off went the engine—down went the nose. The ground came nearer—the machine began to feel strangely light on the controls—my tail wobbled in an eerie fashion.

Mother Earth drew yet closer and closer. Pilot "flattened out" and awaited events or the ambulance.

There was a violent bump as the *tail* met the ground.

Up shot the nose, and, remembering advice so rigidly impressed upon me, open went the throttle.

Suddenly the machine was firm. "Actually on the ground!" The engine was cut off with a sigh of relief. The Flight-Commander rushing up bade me ascend once more.

"No, thank you," was the polite but firm reply.

Subsequent solos followed in rapid succession, the very next one resulting in a forced landing in a field owing to a big end breaking while only 500 feet up. It was lucky the field was there.

Now I have left the scene of my first frenzied flops, and am at present doing dual once again on a tractor machine which really *is* an aeroplane.

Another solo booms threateningly ahead, after which, if I am spared, there may be more to tell.

OBSERVERS ON THE WESTERN FRONT.

R.A.F. kite balloons are the eyes of our guns in France. The observers are highly trained men, and when their balloons are shelled or attacked by enemy aircraft they are forced to make rapid descents by the aid of parachutes.

OVERSEAS SECTION.

A Commentary based upon Practical Experience and a Study of Overseas Opinions.

Overseas Trade after the War.

FOR many years we have persistently urged upon British manufacturers the importance of the Overseas markets and the necessity for improved methods on their part, if these markets are to be retained and developed by British manufacturers—as indeed they must be, in the national interests—after the war. With one or two notable exceptions, British motor cycle manufacturers before the war either failed to realise the importance of these markets, or were content to limit their outlook—and consequently their output—to the demands of the home trade, a short-sighted policy by no means confined to manufacturers in the motor cycle industry.

It is, however, sometimes true that "out of evil cometh good," and there is no doubt that out of this terrible war much good has come for British manufacturers, in that, among other things, they have realised as never before the possibilities and the economy of what is known as "quantity" production, one effect of which has been to revolutionise the methods of pre-war works and factories. The war-time necessity of "quantity" production will prove to be a peace-time necessity also, if British manufacturers are to hold their own against the competition of other nations. "Quantity" production in turn will require that the entire British Empire shall be regarded as the "home market" of the British manufacturer, and this is an entirely feasible and practicable conception of Overseas trade.

Direct Representation of British Firms.

So it comes about that the possibilities of Overseas markets are now being most carefully considered, and plans for their future development are beginning to take shape. One such plan is designed to provide adequate and direct representation of British firms in the most important trading centres Overseas by the establishing of central headquarters, or depots, directly controlled by the home manufacturers, emanating from which headquarters will be up-to-date sales organisations, each covering the whole Dominion or State in which it is operating. Of course, such direct representation may be established by an individual firm, if it be financially strong enough to bear the expense, and this expense be warranted by the volume of business obtainable for its own particular products, but we may assume that it would be impossible for a comparatively small firm to contemplate such a step on its own account, however progressive it might be; hence the suggested development of co-operative representation, which briefly means that a number of non-competitive firms jointly provide the necessary capital and establish such central depots and territorial organisations as those to which we refer. One organisation with this object in view is about to be formed by a group of manufacturers in the motor cycle, tyre, and accessory industries, and it is suggested that operations shall commence in Canada. This, however, we hope will be merely the first step towards similar operations in every other part of the Empire.

IN EGYPT. A D.R. on the road near the Pyramids. Note the width of the bridge, and the fact that the tram rails do not encroach on that part of the road used by other traffic.

Overseas Section.—

Controlling Selling Prices.

THE proposal indicates that the manufacturers concerned realise that the problems of selling and distribution are as vital to the industry as are those of actual manufacture. We cannot emphasise too strongly that upon their successful solution depends the growth of what we are accustomed to call the "movement" in the outlying parts of our Empire overseas. Buyers *must* be able to purchase machines and accessories at prices which are on a level with prices at home, after making proper, but not extravagant, allowance for freight, insurance, packing, and such like necessary charges. The manufacturer *must* control selling prices everywhere and eliminate the series of unnecessary intermediate profits, which, too often, were, and even now are, imposed upon the unfortunate user. Spare parts must be as readily obtainable upon the same reasonable terms.

The Overseas buyer will certainly get his needs supplied on reasonable terms from one source or another after the war. Increased international competition will at all events ensure that condition of things being brought about. The vital question is, will these needs be supplied by British manufacturers or their competitors? We earnestly hope the former, and the development above referred to encourages that hope. But it is a matter which must be taken up seriously by all the manufacturers in the industry. There must be a wider conception of British industry as something of importance, not only to the individuals concerned therein, but as an essential to the growth and development of the Empire as a whole.

We are at last beginning to realise that the well-being of the Empire depends upon the proper recognition and development of its industries, and the individual manufacturer has to recognise that truth and shape his course accordingly.

A Selection of Letters from Readers scattered all over the World.

No English Machines in Ontario.

According to MR. H. HAMILTON, the position of English machines in Ontario is even worse than in Toronto:

"I have lived in Canada for the past five years, and in this city of 27,000 inhabitants there is not one English motor cycle. Indians predominate, with American Excelsiors, Harleys, and Hendersons in the order given. Why is this? Because the nearest English depots are in Toronto, and the objections to English machines are as follow: Very heavy duty on the top of high prices as compared with American twins of high h.p., difficulty and cost of obtaining spare parts, not sufficient h.p., 26in. wheels and small tyres, poor springing front and rear, endless wires, and small lines held together by still smaller bolts and nuts. What is good for English road conditions is not suitable for the Colonies as a whole. A T.T. Rudge frame, 8-10 h.p. J.A.P. engine, three-speed gear box and kick-starter, and 28×3in. wheels, with twist grip control, would be fine, but think of the outlay and duty on such a machine. All chain drive; belt drive is *not* appreciated here."

Roads near Johannesburg.

MR. J. R. MOSLEY, Johannesburg, writes: "I am sending a photograph taken on one of our main roads during the wet season. My mount is a three-speed Bradbury, all-chain drive, which I bought about nine months ago. Since then it has done nearly 15,000 miles, over some very rough roads, and I am highly satisfied with it. It is used as a solo mount as well as a sidecar outfit, and runs quite well as either. I have improved it a great deal by fitting a Binks carburetter."

A Bradbury outfit on a main "road" in the Johannesburg district.

Cars and Cycles in Canada.

A Toronto correspondent, MR. WM. GREENWOOD, writes us on the subject of motor cycle prospects in Canada:

"Knowing that you are interested in trade Overseas, I enclose three cuttings from the Toronto *Telegram* of April 10th, which show the number of automobiles on sale in comparison to motor cycles, and also the low prices at which the automobiles are selling. Can you wonder at the people going in for automobiles in Canada, where we have every facility for storage at home, the advantage in going out when the weather is bad, and in the case of married people with children? The number of Ford cars speaks volumes, and the prices, with the ease of getting new parts! These advantages are all taken note of when the purchaser means business. Some time ago one of your correspondents stated that there were thousands of American motor cycles running round in Toronto. The latest report from the Ontario Government is to the end of March, 1918. Automobile licences, 48,500; motor cycles, 2,000; this gives one automobile to sixty, and one motor cycle to 1,500 inhabitants. It is very important that people writing you should be careful to state facts, as no doubt the English manufactrers are many times influenced by the reports.

"My copy of *The Motor Cycle* did not come to hand for February 14th; maybe the submarine got it. It reminds us that there is a bit of trouble going on somewhere between two or three nations and some unhallowed pirates."

The Question of Wheelbase.

A CANADIAN now serving with the A.S.C., M.T., in England strikes a rather new criticism of the average British machine in the following letter: "As a constant reader of your valuable paper, and a keen Canadian motor cyclist, I venture to express my opinion regarding the ideal Overseas motor cycle.

"As the result of about ten years' experience with both British and American machines, I greatly prefer the former, on account of the better material and workmanship put into it, but, notwithstanding that fact, my after-the-war machine will be an American unless some enterprising British manufacturer turns out a machine which is really suitable for work on Canadian roads.

"One of the chief drawbacks to the British motor cycle for use in the Colonies is its entire lack of comfort, and this, in my opinion, is largely due to too short a wheelbase. Compare the wheelbase of any English machine with that of an American of equal power, and the difference is certainly very noticeable.

"If British motor cycles only had a few American features incorporated within them, such as twist of the wrist controls, 28in. wheels, longer wheelbase, mechanically operated oil pumps, etc., I am convinced that the Colonial demand for them would be enormous.

"I hope that some British manufacturer will endeavour to give us what we want. I am sure he will reap full benefit as a result of his enterprise."

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address

STEEL ROADS.

Sir,—Concerning the proposition put forward by L. W. E. Hartley in your issue of May 16th, *re* sheet steel roads, surely he must realise that in wet weather the number of accidents would be extremely great, owing to the ice-like condition which the surface would assume.

Also, in the heat of midsummer, would not the heat which would radiate from the steel prove very detrimental to the tyres, and also to the comfort of the rider?

Mossley. AYJAYESS.

HEAVY WORK FOR A TWO-STROKE.

Sir,—I see in your issue of May 16th that one of your readers is requiring experiences of a $2\frac{1}{4}$ h.p. two-stroke fitted with a light sidecar. As I have had one fitted to my $2\frac{1}{4}$ h.p. James for the last year, perhaps my experiences may be of some use. Although, of course, fitting a sidecar to any $2\frac{1}{4}$ h.p. comes under the heading "Cruelty to Animals," I must say that my little "'bus" has stood up to the work marvellously. Last summer I made many long runs into the country with a 10 stone passenger, and never once did I have any trouble. I used to average about 90 m.p.g., but speed (if it may be termed such) worked out at about 15 m.p.h. on a sixty-mile trip! How I long for a run on a good old "four."

I can now, of course, only use my bicycle for going backwards and forwards to my work, but still retain the sidecar in order to make the bicycle safer when riding over tramlines in wet weather. T.R.L.

THE POINT OF MAXIMUM EFFECTIVE PRESSURE.

Sir,—As an elementary problem in statics it is clear that, given a *fixed* force above a piston, the position where it exercises its maximum rotary effect on the flywheel is when the connecting rod is at right angles to the crank. For convenience we will call this the right-angle position. Now we know that in an internal combustion engine the explosive force takes a measurable interval of time before reaching its full value. It rises to a maximum, and rapidly falls as the piston descends on the power stroke. It is also clear that a force above a piston can exert no rotary force at the instant when the piston is on the dead centre; and, further, that the position gradually becomes more favourable as the right-angle position is approached. The force may diminish immediately after the dead centre has been passed, but the crank position gradually becomes more favourable. The result of these two opposing factors must be that a point is reached where the maximum *effective* pressure is produced. Where is this point? It appears to me to be not at the dead centre, but at some point between the dead centre and the right-angle position. Will some of your scientific readers kindly give their opinion? H. S. LEFTWICH, Despatch Rider, R.E.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—May we ask the favour of a few lines to reply to "A Few M.T. Fitters, R.A.F.," in your issue of May 2nd? We non-technical privates wish emphatically to contradict their statement *re* motor cyclists *not* doing their own repairs to motor cycles. Evidently they know not what they are talking about or they have never been on active service, as every repair and adjustment that can possibly be done to a motor cycle we *have* to do ourselves. We will give two recent instances, namely, stripping a machine and fitting a new frame, also the *non-technical* job of removing an engine and fitting a new crank case and bushes. These are examples of the jobs we are doing continually, and the only time a machine leaves our hands is when a serious smash renders its complete overhaul by a depôt necessary. We can also say that this is the case of practically every unit on active service. FOUR NON-TECHNICAL PRIVATES, R.A.F.

Sir,—The letter by "A Few M.T. Fitters" is an astounding misstatement. D.R.'s do all their repairs, and are responsible for keeping their machines in serviceable condition. Only in the event of a complete smash up are the machines returned to the repair shops. As a D.R. with over three years' varied experience with the R.F.C. in England and France, I can vouch for this. The idea of an M.T. fitter being required to do "adjustments" and repairs of any description to motor cycles is ludicrous to a D.R. with any experience of service Overseas.

A BROOKLANDS RIDER AND 1st/A.M. D.R.

GUDGEON PIN FIXINGS.

Sir,—In *The Motor Cycle* of May 2nd I notice a paragraph on "Gudgeon Pin Fixings," by "Ixion." My father holds a patent for a fixing. This particular fixing is as follows: The gudgeon pin is taper (standard, more or less), and is about $\frac{1}{8}$in. short each side of piston. Level with end of pin is turned in piston a groove about $\frac{1}{16}$in. wide and about $\frac{3}{32}$in. deep. This groove is at either end if maker thinks fit. *Conical washers* of thin copper are made. The diameter of these washers is the same as that of the pin. These are inserted in gudgeon pin hole and flattened by hitting with a punch or pressed flat. When flat, these washers are expanded into the groove, thereby making a firm fixing. The washers are easily removed by inserting something sharp and prising them out. I would not trouble you with this, only "Ixion" says he has not heard of a better one than he mentions, and, in my opinion, this one is better.

B.E.F. C. H. DICKINSON, Artificer.

Sir,—"Chinook" says, in *The Motor Cycle* of May 16th, that the piston ring method of fixing the gudgeon pin is the best. With this I agree, having been a rider of all makes of motor cycles for the last fifteen years. I have a Rex 1915 8 h.p. twin with the gudgeon pin fixed by a spring ring; and, in my opinion, this method cannot be beaten for safety and accessibility. The Rex Co. have a good many smart ideas in their products, *e.g.*, in the latest 1914 and 1915 models a trough of oil, into which the pistons dip each time, the trough being fed directly by the drip feed. The model (1915) that I have now is their fixed-engine racer, fitted with a B. and B. pilot jet carburetter, geared $3\frac{1}{2}$ to 1. It will tick along in the thickest traffic like a Douglas. I have in the smallest jet that Messrs. Brown and Barlow make for their lightweight, so the petrol consumption would not disgrace a $2\frac{1}{2}$ h.p.; also the oil consumption is very low, as the engine keeps so cool on such a small jet. What the petrol consumption is I will not say, as there are so many unbelievers, but I will say that I have a two-stroke that uses twice as much per 100 miles. My machine has enclosed valves, very silent timing gears, and a quiet exhaust. Even with this small jet the speed is fast enough on war-time roads, and it will climb Sunrising with ease.

G. HARRIS.

MOTOR CYCLES AND THE LUXURY TAX.

Sir,—The following resolution of the Management Committee of the Auto-Cycle Union has been forwarded to the Secretary, House of Commons Committee on the Luxury Tax:

"That, as in normal times a large proportion of privately owned motor cycles are used for professional or business purposes, and as in the present conditions any such motor vehicles can be used only in connection with work of national importance, the Auto-Cycle Union is of opinion that motor cycles cannot in any sense be regarded as luxuries.

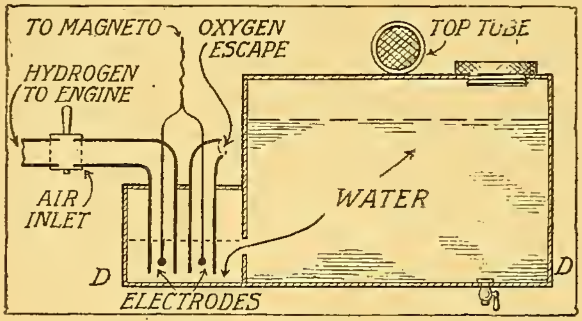
"Furthermore, they would point out that such vehicles are already subject to an annual tax, and that the tax on the petrol consumed by them has been increased since the war. Their manufacture and sale to the public are governed by various regulations made under the Defence of the Realm Act, and any further legislation tending to hamper the production, sale, or use of motor cycles would necessarily be contrary to the national interests."

T. W. LOUGHBOROUGH, G.O.S., Secretary.

HYDROGEN FROM WATER.

Sir,—I note that one of your readers is interested in the use of hydrogen on motor cycles.

For the last three months I have been using water as a fuel on my 211 c.c. Radco with partial success, though it is true I have to start up on petrol.



A method of extracting hydrogen from water.

The current for the decomposition of the water is derived from the earth terminal of the magneto (about 6 volts), but I find there is considerable misfiring at over 15 m.p.h., due, I suppose, to an insufficiency of hydrogen. PILOT.
R.A.F.

CARBURETTER FLOODING.

Sir,—I was returning home the other night after taking a fair singer to her house, where "train and tram were not convenient." It was a perfect spring night. The atmosphere was charged with ozone and flies; my lungs were full of the former and my eyes of the latter, not to mention three of the pests swallowed and one sticking half-way down. My mind still thrilled with the vision of the beauty who, attired in a dream of a cream coat and hat relieved all over by flies, had so recently occupied the sidecar.

I had still six miles to go. It was ten minutes off lighting-up time. My lamps were innocent of carbide. All shops were closed. My carbide tin—yes, with a charge still left—was reposing peacefully beside my goggles in the motor house at home.

Suddenly the dear 'bus—recently new, which had shown my lady on the outward journey how a modern motor cycle should really run—began sputtering, and finally pulled up.

I looked down, and, horrors! petrol was flowing from the new top-feed carburetter, and behaving as though the machine to which it was attached was a suburban watering-cart. With the one eye, with which I could just blink at the time, I peered through the glass disc of the filler cap—of course, after switching off the tap—and, oh! happiness restored. I could have kissed my best love for telling me, if it were not that her tank was covered with the dead and dying—sweet little flies and big fat flies, which had just settled a moment to rest, but, smelling the war spirit underneath, had died in their tracks.

My mind reverted to the nursery story of the horse that pulled up on the edge of the precipice on the dark and foggy night and saved its rider's life. My own charger had acted (or declined to act) in time. Scarcely a cupful had been wasted. A fortnight's allowance was saved.

Everything about the carburetter seemed snug and tight. I decided to push on and dispense with the services of the float chamber, by just turning on a supply as required. After a mile like this I left on the tap and peered through the gloom in the region of the jet. It did not seem to flood. I held my hand under—of course, burning my thumb in the process—but, no, the fly somehow must have extricated itself from the needle valve and found its way into the combustion chamber, where it intended to nest and amuse its young with the electric lights on the plug, but found instead its "future state."

I arrived home fifteen minutes after lighting up time. The police were in the pubs. What a mercy policemen drink!

At last encased in an easy chair and slippers, the first thing that met my eye in an old copy of *The Motor Cycle*—to be precise, page 270, of September 20th, 1917—was a paragraph on "Fits of Flooding," by "Ixion," who declared he had "yet to meet a case of vibration flooding with a top-feed vaporiser." How now, Sir "Ixion"?

Audley. FLYPAPER.

ANOTHER USE FOR SCIENTIFIC WELDING.

Sir,—Quite the most striking feature of the first shipping returns published since Lord Pirrie assumed office was the relatively high proportion of ships that within the specified period had been repaired and returned for use in the nation's interest. But, excellent as the results were, we have reason to believe that a much greater volume of tonnage may speedily be restored by scientific welding, if only the authorities will take full advantage of the business organisations already existing to execute work of this description. In proof of this, we need do no more than point to the feat of the American engineers, who, largely by the aid of welding processes, brought back into commission, in a short period, seventy German ships, with a total of over half a million tonnage, which enemy crews had deliberately damaged. A sufficiency of seaworthy ships may well become the vital factor in the war. For Britain, ships, so to speak, constitute the very life blood, whilst the Allied cause in general will in future largely depend upon the ability to transport and feed the millions of American soldiers who are to be shipped to France and Flanders.

BARIMAR, LTD.,
C. W. Brett, Managing Director and General Manager.

PETROL AND OIL CONSUMPTION.

Sir,—Some months back I read a letter, signed "Snostone," regarding oil and petrol consumption.

Like the writer, I am using a motor cycle every day except Sundays, even when 8in. of snow falls in a day. I have at present two machines, but run a 1916 3½ h.p. Sunbeam with three-speed gear, Sunbeam leg shields, and always carry full kit with me, so that my load appears to exceed that of your correspondent "Snostone."

My own weight is just about 11 stones, and I average 120 m.p.g. solo with war petrol, and 4,000 m.p.g. Vacuum B oil. Perhaps I should state that I commenced motor cycling fourteen years ago, and have owned six machines, as well as riding occasionally on other machines, and during the whole time I have done all my own repairs and am always experimenting. It is to be hoped, therefore, that I have passed the "novice" stage.

With a heavy coachbuilt Millford sidecar I can run 90 m.p.g. on average roads. Apart from the carburetter—a three-jet Binks—and a hot air device of my own, the machine is "standard," and as it is intended in peace times for use chiefly with the sidecar, the gear is low—5¼ to 1. Perhaps that is why I have never attained 75 m.p.h., as claimed by another Sunbeamist!

In conclusion, may I thank you for the excellent articles by Mr. Moore and other writers, which are especially interesting to anyone with chemical and engineering knowledge.

May I also say, as a past owner of a German motor cycle and several Hun magnetos, that my present English make gives the easiest starting and hottest spark of the lot. The magneto has never been touched for 3,700 miles, and for all reasons I shall leave Mr. Ives and his followers to their own fate. They strike me as very similar to the people who imagine that only a foreigner with long hair can play the piano. H. WALKER.

PREPARATION OF POST-WAR MODELS.

Sir,—The Ministry of Reconstruction has under consideration the possibility of granting assistance to manufacturers in the motor and allied industries in the matter of the construction of experimental post-war models of their products.

I should therefore be glad if you would give publicity to this invitation to all such manufacturers to forward to the Secretary of the Motor Industry Branch Committee of the Engineering Trades (New Industries) Committee, 39, St. James's Street, S.W.1, a statement of their requirements in this connection. This statement should represent the most moderate demands possible. It should include estimates of the bulk weight of the different materials required, and should also cover patterns, tools, and other requirements in connection with the manufacture or testing of experimental models. It should also state requirements in respect of labour needed for the production of such experimental models with a view to possible arrangements to permit employment of labour in this way.

Manufacturers are reminded that if it proves possible to complete arrangements in their interests, it remains certain that the facilities which it will be possible to grant will be very limited, and that demands should be framed accordingly.

All statements of requirements must reach the offices of the Branch Committee not later than June 10th.

H. C. B. UNDERDOWN,
Chairman of Motor Industry Branch Committee.

CARBURETTER ADJUSTMENT.

Sir,—I thank you for your kind publication of my little "grouse" at the Binks carburetter's peculiarities. I desire specially to thank the reverend and other gentlemen who have taken the trouble to state their experiences.

I do not claim any special privileges in relation to your already congested space, therefore I will merely state that my conclusions, after carefully studying the pleasures and troubles of your correspondents, are that there is strong suspicion of a weak point in the Binks in the neighbourhood of the main jet, and that it is quite possible that the suction, when the throttle is fully open, might be improved from within, and so prevent that feeling one experiences when opening on to the main after running enjoyably on the second. The feel would best be described by the suspicion that some outside agency had just there and then lifted the top off your engine. The majority, apparently, get along best on a large main such as 9 or 10, but I, singularly enough, never had any decent results from other than a small main jet, such as a 5, and am not desirous, at the present price of petrol, of using 9 or 10 if avoidable.

These little exchanges of views, however, do not do any harm, rather act as an incentive to perseverance, and I certainly shall endeavour to take it out of the Binks when the air has become clearer. H. A. GONNELL.

FRENCH ROADS.

Sir,—As a D.R. who has had two years' experience on divisional and brigade work out here, I venture to offer a few criticisms to the remarks of your correspondent "Tampion."

He expresses surprise that French *pavé* roads are generally disparaged, but really his praise of these roads is a far greater source of astonishment to us D.R.'s than the fact that most writers agree in their condemnation of them. It would be interesting to know how many speed bursts your correspondent has indulged in on these wear-resisting highways, and an exhibition of his powers in cornering at speed in wet weather when the *pavé* is greasy would no doubt be instructive.

Is your correspondent aware that on the majority of *pavé* roads out here it is well-nigh impossible to use top gear on a W.D. Triumph if the road is at all badly worn, and in a greasy condition? I have certainly never encountered a road surface in England so calculated to test one's capabilities for sticking on as a *pavé* road under bad weather conditions, and I feel sure that if our own road authorities started to lay down *pavé* roads, as your correspondent suggests, he would have a difficult task in finding anyone to share his gratification.

I should be interested to know on what part of the Front "Tampion" has seen shell holes filled in with sand bags covered with gravel, as I have at one time and another been on most parts of the British Front, and have yet to come across this extraordinary phenomenon. I quite agree with your correspondent that the roads in the shell zone are bad, but I cannot say that, in my experience, they cause my back tyre to burst "with alarming regularity."

His remarks about Triumph forks make one doubt whether his experience of motor cycling is as extensive as he would have us believe, for while having nothing but praise for the all-round efficiency of this machine, I think you will find that the fork is notoriously one of its least satisfactory features. The spring is continually breaking, and the front wheel bounces about on the road, and makes one wonder whether the fork was designed in collaboration with the leading tyre manufacturers. DON. R.

B.E.F.

LONG V. MEDIUM STROKE ENGINES.

Sir,—Allow me to say a few words in favour of the long-stroke engine. Two important points seem to have been left out of the article by "Mohandis," namely: (1.) That the ratio $\frac{\text{compression space area}}{\text{compression space volume}}$ is smaller in the long-stroke than in the short-stroke. This, of course, assuming that the compression ratio is the same. Hence the heat lost when ignition takes place is less in the long-stroke than in the short. (2.) Having found that the *total* cooling surface in the line of motion is 11% greater in the long-stroke than in the short-stroke, the obvious conclusion would be that the maximum temperature reached during compression is lower for the long-stroke. And since it is the temperature at end of compression that limits compression, we may use a higher compression ratio in the case of a long-stroke, which results in a gain of thermal efficiency. B. BRESLAU.

SPRINGING THE SIDECAR WHEEL.

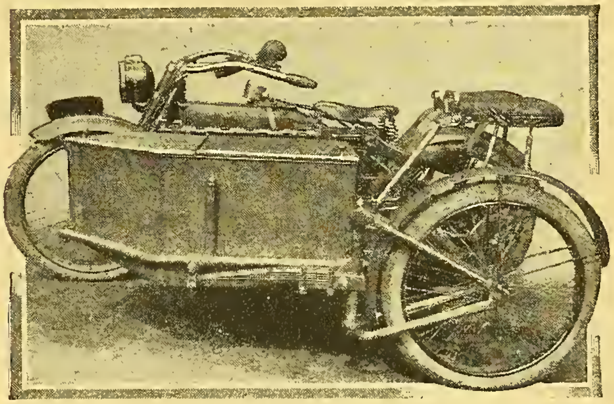
Sir,—Enclosed I have the pleasure in sending you a photograph of my design of a sprung sidecar wheel.

The design as shown combines a castor wheel with a cantilever spring and a locking arrangement. The castor wheel can be secured so that the wheel only can be moved in a vertical direction. The locking arrangement is placed on the back stays of the sidecar wheel and the sidecar frame, and is made strong enough to withstand all side stresses in taking corners, etc., but it in no way hinders the wheel in its vertical motion. The arrangement, therefore, can also be used without the castor wheel, and thereby the manufacturing price can be lowered; but, in many respects, the castor wheel has advantages, so I personally prefer the combination and the simple locking arrangement for setting the castor wheel out of action where the conditions are such that this is preferable.

The motor carriage shown is used by one of our Volunteer Corps, and carries two men on the motor cycle and one in the sidecar, and, further, there are mounted two or three automatic rifles on the sidecar and ammunition in the steel cases.

The weight distribution on this sidecar is much better than on the ordinary pattern, and therefore I think that this spring improvement would be of great value in connection with the machine gun or the ambulance sidecar.

Denmark. HERSLEB CHRISTIANSEN.



A sprung wheel machine gun sidecar fitted with a castor wheel that can be locked or released whilst in motion.

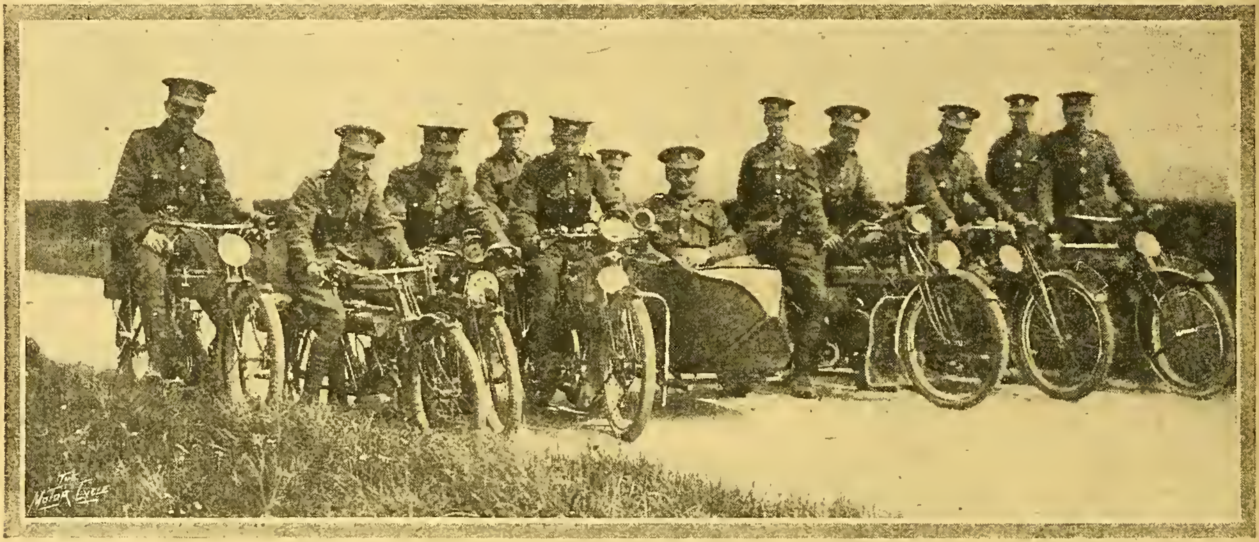
Test Run of the East Yorkshire M.V. Corps.

On Whit-Monday, the East Yorkshire Volunteer Corps, now one of the strongest motor volunteer corps in the country, held a test run. This corps has a membership of some three hundred and forty-seven officers and men, and includes motor cycle, light car, and car sections, heavy vehicles, and a strong detachment of ambulances and drivers.

Major A. J. Atkinson, who is in command of the corps, and to whom most of its popularity and success are due, was at the head of Monday's test run, being preceded by two motor cyclists; ten other motor cyclists took part in the run, whilst sixteen cars formed part of the procession. The run was from Hull, through Collingham, Beverley, Driffield, to Bridlington, where a stop of two hours was made before the return.

Lunch, which was carried by the men, was taken at the roadside, whilst the object of the test was the important one of ascertaining the exact distance to be kept by military cars from each other on a mobilisation, and the practice of the various signals used in the Army for motor vehicles on the move.

The test was an entire success, and much useful information was obtained, whilst a pleasant day was spent at the expense of a small quantity of the members' petrol, as it could not be provided by the authorities.



A section of the East Yorkshire Motor Volunteer Corps starting for their test run.

A Sketchy Reminiscence.

There are occasions when across the human brain flashes a series of pictures, or, to modernise, a "cinema film" of past incidents, generally without connection with or bearing upon the occupation of the moment.

There are periods of monotony for the man on active service when these mind pictures come dancing into one's head, and a few minutes pass in that state of absentmindedness quaintly termed a "brown study." By a seeming spirit of contrariness, a D.R.'s period of inactivity outside some headquarters' office, in a shell-battered cottage, with a squelch of Flanders mud around, and a cold, soaking drizzle falling, may be alleviated by some glimpse of a past summer such as the following:

A misty morning, seven o'clock, Lynmouth—that glory of woods and streams, of brown moorland water surging among boulders, under a roof of green foliage pierced by streaming shafts of sunlight.

To many a trials rider all these may have meant nothing more than a nightmare of hills and hairpin corners, with abominable surface of red mud and stones. On the morning of which I think, the moisture-laden atmosphere, which heralds a hot day, was hardly sufficient to lay the dust. By the time the tank had been filled, a few necessary adjustments made, and the hotel bill settled, the sun was making grand play upon the towering piles of woods above the Lyn. An easy climb out of the village over the new-cut road soon opened up before me the open air and rolling country of Exmoor. The road wound around heather-clad downs, still an indistinct blur of purple in the morning air. No hurry; this is no time for 30 m.p.h., but the slower the better. Disturbance of this peaceful domain by raucous exhausts seems almost a sacrilege. A quiet progress has another advantage: aided by a light breeze in my face, a turn of the road round a small bluff brings me unexpectedly upon a stag and two hinds. Magnificent creatures; the stag carrying a fine pair of antlers of many tines. I have a memory of rich red-brown coats and the curious curling up of the lips as they feed; then a startled stare, a toss of the splendid heads.

A peremptory order brings me back to earth in the squelching misery of winter in Flanders, and the vision is gone. But what a treasure house is memory!—F.S.

QUESTIONS & REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Book on Magnetos.

Can you inform me if there is any book that deals with magnetos more fully than your "Motor Cycles and How to Manage Them"? This is very good, but it does not go deeply enough into the theory of the subject. I also require one that explains car magnetos. —H.B.

We recommend you to obtain a copy of "Electricity and the Motor Car," which deals with all types of magneto. This handbook is obtainable from *The Motor Cycle* offices, 20, Tudor Street, London, E.C.4, price 2s. 10d. by post.

Difficult Starting and Blowing Back.

I have recently had a magneto fitted to my twin Sarolea engine, and I am having much trouble in starting. (1.) When the engine is cold it will start up the first pull over, after I have primed it, but when I stop it I cannot start it again until it has stood for a few hours. I have primed the engine when warm, but to no purpose. There is always a good spark with old and new plugs, and there is also good compression. The magneto is a very small one, but nearly new, only it has been standing for some time. Do you think that it wants remagnetising? (2.) Can you tell me the reason for petrol blowing out of the air inlet of the carburetter when the engine is running? The carburetter is a B.B., with a needle running from the throttle to the jet. Do you think this is suitable for a twin, as the engine runs very unevenly? I use No. 3 petrol.—S.A.E.G.

(1.) The trouble is certainly rather a mysterious one. It might possibly be cured by using a slightly wider spark gap. The exact cause is not apparent, but it might be due to condensation across the plug points, or oil on the plug points. We do not think the magneto is likely to be at fault in your case, otherwise it would not start the engine in the first instance. (2.) The carburetter, if properly tuned, should be quite suitable. If petrol blows back through the inlet pipe all the time the engine is running, it is probably because you have too weak an inlet valve spring. If the blow back only occurs when the engine is stopped after running a few seconds, and petrol drips out of the inlet pipe, it is due to condensation of petrol on the walls of pipe and carburetter. Try taking the air in warm by connecting the air inlet to a muff surrounding the exhaust pipe.

Balancing a Two-stroke Engine.

I am riding a Paragon two-stroke, which runs well up to about 15 m.p.h.; if I exceed that speed, it seems as though everything inside was loose. The bearings are new and a good fit, both ends of connecting rod tight, and no side play. Do you think it can be the balance, and how can I find out? Will you please let me know the way to find the correct balance?—A.E.S.

How to balance an engine is fully set forth in our handbook "Motor Cycles and How to Manage Them." The chapter on the subject is a long one, so that you will understand that it is impossible on this page to give all particulars as to how to balance an engine. Briefly, the mechanical balance is arrived at by adding the weight of the rotating and half the weight of the reciprocating parts to the flywheel at a point opposite the crank pin. What you complain of is probably due to a loose-fitting piston; that it is due to bad balance is rather improbable. Another cause may be that the engine is particularly dirty. This will cause pre-ignition, and you may mistake the "pinking" noise of the pre-ignition for a rattle of the bearings.

The Correct Size Jet.

Having recently bought a second-hand Bradbury, I should like your advice. I think I am wrong in the timing of the magneto, so if you will help me I shall be very much obliged. (1.) Is there a standard size of jet for this machine? The carburetter is a B. and B. with a jet marked 34. (2.) Will you kindly give me the timing for the magneto? (3.) In putting the engine together I find there is a crack in the exhaust valve seating, extending down the cylinder and 1¼in. into the exhaust chamber. Is it possible to have this repaired by welding?—R.H.

(1.) We should say that a 33 or 34 jet would be correct. (2.) The magneto timing should be as follows: Place the piston exactly on top dead centre of compression and firing strokes and connect up the magneto with the points just about to break and the ignition two-thirds retarded. (3.) We should say that the crack could be welded satisfactorily by the oxy-acetylene process, but it depends on where it is. You had better submit your cylinder to one of the well-known welding firms, and ask them if they can guarantee to make a good job of it.

Motor cyclists of the West Riding Volunteers partaking of an impromptu lunch by the roadside. See page 530.

Flywheel out of Truth.

I have a 1913 Douglas, and, after taking it down to clean it, I took the flywheel off, and on reassembling it I find it is out of line and wobbles, and, no matter what I try, I cannot get it right. The main bearing seems all right, and there is no vertical play. (1.) Will you please tell me the cause and remedy? (2.) Also, what pistons will fit a 1910 Douglas?—C.S.

(1.) It is possible that you have not got the flywheel properly on the key, as if it were running truly before you took it off it should go back in truth. The only fault of which we can think is that you have not replaced it correctly and it is riding on the key. Better remove it and have it tested in a lathe by fixing it on a true mandrel and running it between centres. (2.) The only pistons which will fit a 1910 Douglas are Douglas pistons of the 1910, 1911, and 1912 models.

Composition of Dry Batteries.

Can you please inform me how to refill a dry battery? If so, I shall be greatly obliged.—G.W.

The interior of a dry battery usually comprises a zinc outer casing (to which is connected one of the terminals) and a central carbon rod or plate (to which is attached the other terminal). Around the carbon rod or plate is packed a mixture of crushed carbon and manganese, and round this is packed some absorbent material, which varies according to the make of the cell. Some use spun glass, others sawdust, etc. Without knowing the make of your cell, it is impossible for us to tell you how to refill it. We may say that it hardly pays to refill old dry batteries, as new ones can usually be bought for less than the cost of the materials. In many instances it is possible to get a little more current from an exhausted dry battery by immersing it in a strong solution of sal-ammoniac in water. Drill a number of small holes in the base of the battery, and immerse it in the solution for several hours.

Change Speed Gear Conversions.

I have purchased a second-hand 3½ h.p. clutch model single-geared Triumph of about the year 1912. I have attached a sidecar (light), and would like to be able to negotiate hills a little better with a passenger. Can you please inform me whether a three-speed hub wheel of later date would fit the rear forks if I could manage to buy one? Also do you know of any two-speed gear which I could attach? If not, which would be the most suitable means of attaining my object?—NOVICE.

We should not recommend you to buy a three-speed hub wheel for sidecar work. It would be rather difficult to fit, and might not give you satisfaction when you have fitted it. You might obtain, by advertising in *The Motor Cycle*, an N.S.U. engine-shaft two-speed gear, which could be fitted quite easily. Alternatively, a Philipson pulley would be of considerable assistance on hills of moderate gradient, this being a pulley to provide automatic changes in gear ratio.

Paraffin Vaporisers.

Can you tell me if the Silver or Morgan vaporiser would vaporise paraffin effectively on a Morgan Runabout? I shall also be much obliged if you would give the addresses of the makers of both.—R.B.

We have had no practical road experience with either vaporiser, but we understand that both are quite satisfactory. The makers' addresses are: the Morgan vaporiser—Mr. Morgan, 74, East Hill, Wandsworth, London, S.W.; and the Silver vaporiser—Mr. T. Silver, Quadrant Co., Lawley Street, Birmingham.

Timing of Small Engine.

I have a J.E.S. auxiliary set, which I am anxious to keep till after the war. I want a new cam wheel, but cannot obtain one. I got one made at a local garage, and a gap of $\frac{1}{8}$in. has been left between tappet and valve. Is this correct? The timing also does not seem correct; the exhaust valve closes before it reaches the top dead centre of exhaust and inlet strokes. How can I alter this?—G.N.R.

The gap between tappet and valve is far too great; it should not exceed the thickness of a thin visiting card, slightly less than $\frac{1}{64}$in. If you set the timing wheels for exhaust valve to be down on its seat when the piston is on dead centre of exhaust and inlet strokes, the new cam should make the valve *commence* to open, not *be* open, when the piston is within $\frac{5}{16}$in. from the end of firing stroke.

To Every Reader of "The Motor Cycle."

IN view of the serious shortage of paper it is desirable that readers of "The Motor Cycle" should place *definite orders* with their newsagents for copies to be reserved or delivered weekly. ¶ The custom of chance buying leads to wastage of paper, as copies ordered for casual purchasers may be left unsold, owing to fluctuating demand. ¶ On the other hand, if standing orders are given, newsagents and publishers can regulate the supply so that, *while the requirements of regular readers are satisfied, the risk of wastage is reduced to the minimum.*

If YOU have not already done so, please give a definite order THIS WEEK, and thus assist to economise paper.

Constant Pressure v. Constant Volume Type of Engine.

Have any experiments been made on the following lines? A spray of liquid fuel, such as petrol, will, if injected into a vacuum, instantly vaporise. Further, an engine of the constant pressure type, for automobile work, would be much more economical than the constant volume type. I suggest an air-tight vaporising chamber with automatic jet inlet, and outlet connected to a pump driven by the engine, the pump to draw the vapour from the chamber and to force it into the cylinder at correct time through a needle valve; sparking plug placed close to needle valve; extent of vacuum in vaporising chamber to be adjustable.

(1.) Would the compression of the vapour in the pump condense it, or would the generated heat by quick compression retain it as vapour? (2.) Is not the suction of a constant volume type sufficient to create enough vacuum in the vaporising chamber to vaporise a spray before admixture with air?—H.L.B.

So far as we know, no motor cycle engine has been made on the lines you suggest. While we are of the opinion that the vapour would not be condensed by the pressure of the pump, we think that the suction would be sufficient to vaporise the spray. We regret we cannot give you a more definite opinion on the subject.

Alternative Routes.

I have been granted a small quantity of petrol for my leave, and intend to ride from Marlborough (Wilts) to Chester. Two routes are advised: one *viâ* Swindon, Cheltenham, Tewkesbury, Worcester, Kidderminster, and Wellington; the other *viâ* Newbury, Oxford, Rugby, Wolverhampton, and Newcastle-under-Lyme. Would you be so good as to inform me the better route, in your opinion?—M.A.H.

We advise the route *viâ* Cheltenham, Worcester, and Wellington. The alternative suggested is not only a longer route, but going to Rugby and then to Wolverhampton would be almost equivalent to retracing your steps.

RECOMMENDED ROUTES.

BRAMSHOTT TO ORPINGTON.—W.J.P.

Bramshott, Hindhead, Godalming, Guildford, East Clandon, Great Bookham, Leatherhead, Epsom, Sutton, Croydon, West Wickham, Orpington.

HULL TO BURTON-ON-TRENT.—E.R.T.

Hull, by ferry to New Holland, Brigg, Gravingham, Blyton, Gainsborough, Retford, Worksop, Mansfield, Sutton-in-Ashfield, Alfreton, Derby, Burton-on-Trent.

RUGBY TO NEW BRIGHTON.—J.S.

Rugby, High Cross, Atherstone, Weeford, Lichfield, Armitage, Rugeley, Weston, Stone, Pipe Gate, Woore, Nantwich, Tarporley, Chester, Birkenhead, New Brighton.

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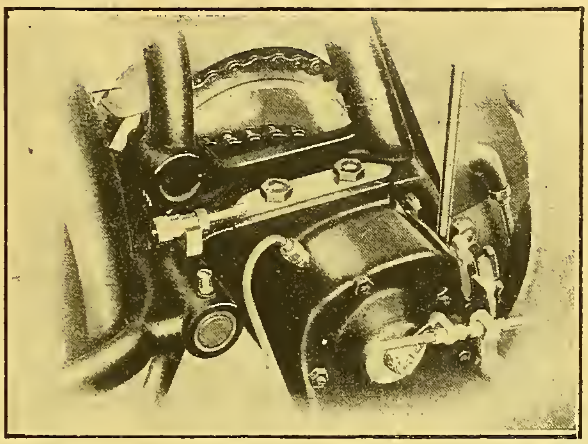

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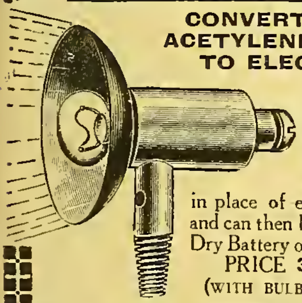

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This outfit comprises a complete installation for the electric lighting of a motor cycle and sidecar. It includes best quality Motor Cycle Head Lamp with Switch Attachment, as illustrated. Sidecar Lamp with Switch Attachment. Tail Lamp with switch and bracket for attachment to Carrier of Motor Cycle, or to back of Sidecar. One Set of Bulbs and one Spare Set. Set of "Volex" Batteries (this can be carried in bottom of sidecar). Complete wiring and connections. A Handsome Lighting Set, giving splendid results, and designed to ensure extreme ease in fitting.

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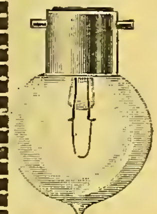

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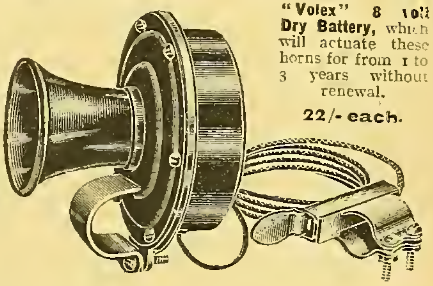

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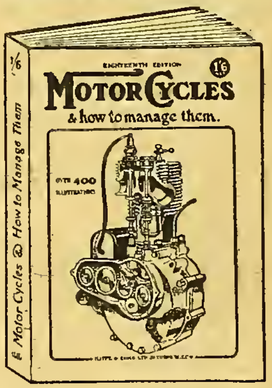

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MOTOR CYCLES FOR SALE.

Alldays.

2½h.p. 1914 Allon, 2-speed model; price £15, bargain —Wauchope's, 9, Shoe Lane, London. [5598

ALLDAYS Allon, genuine 1916, 2¾h.p., mag., 2 speeds; 25 gns.—Wandsworth Motor Exchange. Ebner St., Wandsworth (Town Station). [5530

LATEST Model Allon de Luxe, 2 speeds and free, countershaft, hand clutch, only done a few hundred miles; accept £32/10, cost nearly £60.—15, Priory Rd., N.8. [5484

ALLON, 2¾h.p. single, £38, new; 2-speed, £45, new; 2-speed and hand clutch, £48, new; 2-speed, £28/10; E.P., or exchange. — Service Co., 292, High Holborn, London. [X4734

ALLON, 2¾h.p., brand new, 2-stroke, never been on the road, and guaranteed; reduced price £32.—Maudes' Motor Mart, 100, Gt. Portland St., London. W.1. Tel.: 552 Mayfair. [5572

Ariel.

CROW Bros., Guildford, Ariel agents.—New and over hauled second-hand models in stock. [5370

Auto-Wheels.

AUTO-WHEEL, B.S.A. Model de Luxe, in good running order, Hammond shock absorber, low mileage since being overhauled by firm; £5/10.—Box 1,981, c/o *The Motor Cycle.* [X4866

Bat.

1912 8h.p. Bat-Jap, 2-speed, clutch, chain drive 650×65 Dunlops, good condition, lamps, speedometer, spares, Chater sidecar, pleasure body, interchangeable tradesman's box carrier, carry 4-cwt.; £35.—Fraser, Cherry Orchard, Gt. Missenden, Bucks. [5543

Bradbury.

BRADBURY, 1914, 6h.p., and sidecar, £55; 1912-1913 3½h.p., 3 speeds, with coach sidecar, £32/10; 1913 3½h.p., 3-speed model, £29/10.—Motor Exchange, Horton St., Halifax. [5494

Brough.

BROUGH, 1916. 3-speed, 3½h.p., speedometer, lamps, horn, etc.; £65; E.P. or exchange.—Service Co, 292, High Holborn, London. [5580

B.S.A.

B.S.A., 1913, 3½h.p., 2 speeds; £25.—47, Streatham Hill, S.W. [5519

B.S.A. New No. 2 De Luxe Sidecars in stock for immediate delivery.—Wauchope's, 9, Shoe Lane, London. [5602

B.S.A. Combination, 3-speed, £59/10; 1916 ditto, £65; E.P. or exchange.—Service Co., 292, High Holborn, London. [5579

1917 B.S.A., 4¼h.p., chain-cum-belt, semi T.T. bars, good condition; £55.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0552

B.S.A., late 1916, 4¼h.p. Model H., all chain drive, as new, ridden only 260 miles, Smith's trip and watch speedometer, F.R.S. lamp; £58.—Hucklebridge, 133, Sloane St., S.W.1. [X4905

4¼h.p. 1916 B.S.A., 3-speed countershaft model, all-chain drive transmission, clutch, kick starter, condition almost as new, includes accessories; price £55; a new B.S.A. De Luxe sidecar is available, and can be fitted at once if required.—Wauchope's, 9, Shoe Lane, London. [5586

Campion.

1916 Campion, Villiers, 2½h.p., 2-stroke, Dunlop tyres and belt, aluminium footboards, thoroughly overhauled, guaranteed good running condition; bargain, £27/10.—Tebbett, 21, Hotel St., Coalville. [X4900

MOTOR CYCLES FOR SALE.

Calthorpe.

1916 Calthorpe, 2-stroke, lamps and horn; £30.—Parker and Son, St. Ives, Hunts. [5583

1915 Calthorpe-J.A.P., 2¾h.p., Enfield 2-speed, new tyres and accessories; £25.—86, High Rd., Lee, S.E. [5461

1914 Calthorpe Junior, 2½h.p., 2 speeds, free engine. in splendid condition; £15.—99, Grove Park Rd., Chiswick. [X4888

1915 2¾h.p. Calthorpe-Jap, Enfield 2-speed, Senspray carburetter, good condition; £22.—Trevers, Colin Park, The Hyde, Hendon. [5550

2½h.p. Calthorpe, 2-stroke, 2-speed model, 1915 machine, but little used, including accessories; £22/10, bargain.—Wauchope's, 9, Shoe Lane, London. [5589

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [4947

1915 2¾h.p. Calthorpe-Jap, Enfield 2-speed, fitted up to run on paraffin, new tyres, perfect condition, all accessories.—Langford, 62, York St., Twickenham. [5456

BARGAIN.—1916 Calthorpe-Jap, 2¾h.p., 2-speed model, fully equipped, and unused for 12 months; £25.—Captain Edwards, 89, Wigmore St., London, W.1. Mayfair 283. [5366

1916 2¾h.p. Calthorpe-Jap, Enfield gear, lamps, horn, speedometer, mirror, watch, tools, everything in first-class condition, tyres almost new; petrol; £26.—A. B. Glen, Dalry, Ayrshire. [X4769

CALTHORPE, 2½h.p., 2-speed, free engine, late model, good Dunlops, fast and perfect; call Thursday evening, otherwise appointment; price £20.—Harrington, 136, Harrington Rd., South Norwood, London, S.E. [5522

Chater-Lea.

3½h.p. Chater-Lea, White-Poppe, Bosch mag., variable countershaft gear, kick start, coachbuilt sidecar, wind screen, smart turnout, all in excellent condition; bargain, 30 gns.—Box L6,272, c/o *The Motor Cycle.* [5470

Clement.

2¼h.p. Clement, U.H. mag., B. and B., good condition; £6/10.—152, Camberwell Grove, Camberwell. [5528

Clyno.

2½h.p. 2-stroke Clyno, pink of condition, accessories included; price £22/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5600

CLYNO 6h.p. Combination, 1914-15, nearly new, £65; exchange for good lightweight, or 3½-4½h.p. M.C. and cash, sidecar optional.—11, Pretoria Av., Walthamstow. [5512

CLYNO Coachbuilt Combination, 5-6h.p. twin, enclosed Bosch, 2 speeds (countershaft), kick, lamps, mechanical horn; any trial; great sacrifice, 29 gns.—Brown, 1, Ebner St., Wandsworth. [5533

6h.p. Clyno 1914 Combination, large roomy sidecar, child's seat in front, beautifully sprung, 3-speed gear, kick starter and clutch, nice turnout, and smart; £65; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5597

Connaught.

CONNAUGHT, 1913, 2¾h.p., 2-stroke, Bosch, Brooks 104, engine and tyres very good, unused 2 years; £13, near offer.—Box L6,273, c/o *The Motor Cycle.* [5469

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

DOUGLAS, 2¾h.p., 2 speeds, kick starter, and speedometer; £25.—47, Streatham Hill, S.W. [5520

DOUGLAS, 1916, 2¾h.p., 2-speed, lamp and horn, equal to new; £48.—P. Deery, Strabane. [X4904

2¾h.p. Douglas, in perfect condition, new tyres, lamp, horn; £20.—Haslett, The Oaks, Bressingham, Norfolk. [5514

DOUGLAS, 2¾h.p., 2-speed, Bosch, excellent condition, crate; £25.—Crowther, Ringwood Rd., Ferndown, Dorset. [X4875

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat Yeovil. Tel.: 50. [5855

1913 Douglas, 2-speed, new heavy Dunlop, unused 3 years, excellent condition; £22.—116, Seabrook Rd., Hythe, Kent. [5255

DOUGLAS, 1916 model, 3 speeds, and kick starter, very little used; £50, or near offer.—Box L6,251, c/o *The Motor Cycle.* [5397

1913 2-speed Douglas, kick starter, perfect order, first-class condition; £20, bargain.—Box 1,982, c/o *The Motor Cycle.* [X4877

DOUGLAS, 2¾h.p., 2-speed, 1911, very fast, little used, lamp, horn, etc.; £20.—Wiseman, 57, Gray St., Scotstoun, Glasgow. [X4850

1913 2¾h.p. Douglas, 2-speed, recently thoroughly overhauled, not since used; bought car; £29.—Elly, Glen Lea, Uttoxeter. [X4852

1913 Douglas, 2¾h.p. twin, 2-speed gear, footboard, usual accessories, splendid condition, very fast; £25.—R. Bamber and Co., Ltd., 33, Liverpool Rd., Birkdale, Lancs. Tel.: 44. [4858

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DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

1912 2¾h.p. Douglas, 2-cyl., clutch, Bowden controls, 2 speeds, excellent condition, tyres good.—Carleton and Tulloch, 15a, Down St, Piccadilly, W. 'Phone: Mayfair 1037. [0948

DOUGLAS.—New 1918 models supplied to farmers. doctors, etc., against Ministry of Munitions permit. 1915 2-speed Douglas, £39/10; 1914 2-speed model, £34/10.—Motor Exchange, Horton St., Halifax. [5495

DOUGLAS 1915 4h.p. Combination, 3 speeds and kick start, all accessories, bargain, £60; four 1914 2¾h.p. models, all in excellent condition, from £32/10—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [5568

1917 4h.p. Models A. and B. Douglas, 2¾h.p. Model W., also U. and V. 1916 specification, absolutely new; immediate delivery against Priority Permit for doctors, farmers, war and munition workers.—How and where to apply, full particulars, write Douglas Specialists, Robinson's Garage, Green St., Cambridge. [5587

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1915 Edmund, with sporting Canoelet coachbuilt sidecar, M.A.G. twin engine, mag., Enfield gear, lamps; any trial; only 46 gns.; exchange lightweight.—Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). [5531

Enfield.

ENFIELD, 1915, 6h.p., 2-speed coach combination, in fine order, £72/10; 1916 model, £82/10.—Motor Exchange, Horton St., Halifax. [5496

1913 2¾h.p. Twin Enfield, 2-speed, free engine, kick starter, excellent condition; £25, or near offer. —Young, Enderlie, Aldridge, Walsall. [5546

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

ENFIELD Late 1915 Combination, £72/10; 1916 combination, splendid order, 80 gns.; E.P. or exchanges.—The Service Co., 292, High Holborn, W.C.1. [X4732

2¼h.p. 1916 Enfield, 2-stroke, 2-speed model, handy little machine, mechanically sound as new; £37/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5595

1916 Enfield Combination, 6h.p., lamps, horn, hood, screen, speedometer, splendid condition; £80.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0551

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6h.p. 1915 Royal Enfield Combination, Lucas dyna lighting set included, £77/10; also a 1917 mo combination, fitted with all accessories, £87/10; 19 model combination, £35; also a 3h.p. 2-speed solo mou £32/10; all guaranteed.—Wauchope's, 9, Shoe La London. [55

FOR Sale, Royal Enfield motor cycle and coachbu sidecar, 6h.p. twin-cyl. J.A.P. engine, late 19 self-starter, electric lighting, Hans Renold chains, mi age 2,500, perfect condition.—Price and full particula apply, Moody Bros., Blyth Motor Garage, Blyth, Nor umberland. [09

1914 6h.p. Enfield Combination, done about 5,0 miles, overhauled Nov. last, sidecar painted a varnished, electric lighting and electric heated carb etter; owner engineer in Forces since 1914, mach only used on leaves, in perfect order, all spares; £65 Apply, A. J. Neville, Cromwell Mews, South Kensi ton. [54

Excelsior.

1915 Excelsior, 2-stroke, special carburetter, m.p.g., splendid condition; bargain, £20.—Anderson, Main Rd., Whitletts, by Ayr. [X4

F.N.

5-6h.p. 4-cyl. F.N., 2-speed, clutch, h.b.c.; seen r ning; engine requires overhauling; best offer o £12.—Hill, Old Somerby, near Grantham, Lincs. [5

Harley-Davidson.

7-9h.p. Harley-Davidson Combination, 1916 mo Bosch mag., all accessories; price £65.—W chope's, 9, Shoe Lane, London. [5

LATE 1916 Harley-Davidson, electric model, fit with 1917 Mills-Fulford coachbuilt sidecar; o to offer, or exchange smaller power.—Oram, Colin Pa The Hyde, Hendon, N.W.9. [5

Henderson.

1914 Henderson, with Ivy sidecar, in good run order, 70 gns.; also P. and M., 1909, wants pairs, £10, with cane sidecar.—W., 1, Princes Rd., We Som. [X4

Humber.

BARGAIN.—3½h.p. 2-speed Humber Combinati £17.—80, Bispham Rd., Southport. [X4

1914 Humber 2¾h.p. Twin, 3-speed gear, clut usual outfit, in splendid condition througho £20.—R. Bamber and Co., Ltd., 33, Liverpool Rd., Bi dale, Lancs. Tel.: 44. [4

HUMBER Combination, 1914, very little u £26/5; Humber lightweight, £21; scarcely soil many others to be cleared at any reasonable offer; quiries invited.—Buntings, Masons Av., Harrow. [5

Indian.

INDIAN 1916 Powerplus Combination; £85.—Streatham Hill, S.W. [5

1914 Indian, 7-9h.p., clutch, fine condition; £3 Box 1,917, c/o *The Motor Cycle.* [X4

1915 5h.p. Red Indian, T.T. model, 3-speed, clut 38 gns.—Railway Garage, Staines. [5

1913 7h.p. 2-speed and Clutch Indian Combinat quite perfect, 2 new tyres; bargain, £3 Treffry, Kingsbridge, Devon. [5

INDIAN, 7-9h.p., 1915¾, clutch model, mileage 2,0 condition perfect and new, 80 m.p.g.; best o above £35; genuine bargain.—Sutton, Little Clac Essex. [5

1915 7-9h.p. T.T. Clutch Model Indian, in splen condition throughout; rare bargain for qu sale, £24/10.—Peat, 72, The Chase, Clapham Comm S.W. [5

1915 Indian, 7-9h.p., 3-speed gear, fitted with ha some de luxe sidecar, electric lighting, sound reliable; £65; guaranteed.—Wauchope's, 9, Shoe La London. [5

INDIAN, 4h.p., 2 speeds, £22/10; 7-9h.p., free gine twin, £23/10; 1914, 7-9h.p., 2-speed, sp frame, Millford sidecar, £49/10.—Motor Excha Horton St., Halifax. [5

INDIAN (red), almost new, under 2,000 miles, 7-9 twin, mag., 3 speeds, kick; great bargain, gns.; lower power part exchange.—Wandsworth M Exchange, Ebner St., Wandsworth (Town Station). [5

1916 5h.p. Indian Combination, 25 gns. Swan sp ing sidecar, 3 speeds, clutch, kick starter, lap and accessories, the whole combination painted yel black lined; £55, bargain.—Colson, 41, Stile Hall dens, Chiswick, W. [5

Invicta.

INVICTA, 2½h.p., 2-stroke, 2-speed, late 1915, cellent order, under 2,000 miles.—W. Fox, His Harrow Drive, Romford. [5

Ivy.

1916¾ Ivy-Jap and sidecar, 3-speed countersh 55 gns.—24, Granard Rd., Wandsworth Comm S.W.12. [5

James.

JAMES, 4¼h.p., 1914, and sidecar, 2-speed, new D lops, rear steel studded, speedometer, lamps, h mileage only 4,500; £48.—Wilson, 1, Lynton Vi Aldeburgh, Suffolk. [5

MOTOR CYCLES FOR SALE.

James.

IES 3½h.p. Twin, 1917, mileago noder 3,000. ibsolutely perfect, Lucas lamps, speedometer, horn: s.—Gaskell, Kilton Rd., Worksop. [5507

IES, all new models; extended payments or exchange; also 3½h.p. twin, 3-speed, kick starter, ete with Lucas lamp, £45.—Service Co., 292, High rn, London, W.C.1. [X4728

.E, James 1916 3½h.p. twin, 3 speeds, kick starter, hand controlled clutch, Senspray carburetter, Mille set, excellent condition; £45.—Lieut. Hogg, G.S., c/o Brunner, Mond and Co., 'Gadbrook, iwich. [X4764

J.A.P.

14 6-8h.p. J.A.P. Combination, lamps and horn 3-speed, kick starter, good condition; £38, or .—Parker and Son, St. Ives, Hunts. [5585

). J.A.P. (twin), 1912-13, complete with Bosch mag., Senspray carburetter, lubricator, extra out lywheel, chain, sprocket, and brackets (can be used ycle car), good running order; reasonable offers ered; letters first.—Body, 7, Weir Av., Raf gh, Cove, Hants [X4771

Levis.

VIS, 1916, single, £22; E.P. or exchange.—Service Co., 292, High Holborn, London. [X4735

VIS, 1915, lamp set, horn, footboards, new heavy Dunlops; £17 cash.—Spurr, Bridge St., Earlestown. s. [X4891

VIS, 2¼h.p., 1916, 2-speed, free engine, perfect throughout, kick starter, head lamp, generator, lamp, tools, fully equipped, very economical, splen limber; bargain, £27/10.—Mebes and Mebes, 154-6, Portland St., W.1. Tel.: 3426 Mayfair. [5581

Lincoln-Elk.

NCOLN-ELK, 1914, 6h.p., countershaft gear, belt and chain drive, underslung coach sidecar; £45.—r Exchange, Horton St., Halifax. [5498

L.M.C.

.RGAIN.—3½h.p. L.M.C. coachbuilt combination, thoroughly overhauled; £18.—10, Norwood Cres Southport. [X4849

Matchless.

ATCHLESS 6h.p. Combination, 2-speed hub, good condition; £37/10, or exchange lathe.—Todd, 49 ke Rd., Walthamstow. [5451

ATCHLESS.—Delivery from actual stock of M.A.G and J.A.P. engined models; exchanges if desired udes', 100, Gt. Portland St., London, W.1. [5570

ATCHLESS Latest War Model Combination, complete with detachable wheels, spare wheel and tyre: .—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter.

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18 Matchless Combination, W.O. Model, electric lights, spare wheel, absolutely as new; £115.— and Co., 15-16, Bishopsgate Av., Camomile St., 3. [0492

ATCHLESS Combination, 8B, M.A.G. engine Gloria spring wheel sidecar, wind screen, speed er, electric lighting; £75, or take Douglas part inge.—Warrendene, Warren Rd., Wanstead. [5513

p. 1918 War Model Matchless Combination, in condition as new, fitted with non-skid Palmers all s, spare wheel and tyre, detachable wheels, superior e with back-rest, complete with lamps and warning l; £115; guaranteed.—Wauchope's, 9, Shoe Lane, on. [5590

New Hudson.

14 New Hudson 3-speed Coach Combination; must sell; best offer; exchange.—24, Townley Rd., ich. [5542

15 New Hudson, 4h.p., 3 speeds, clutch, kick start practically new condition; price £37/10.—Gibbs ett St., York. [X4841

16 New Hudson 2½h.p. 2-speed Motor Cycle, not ridden 10 miles; bargain, £32/10.—Abson, 49 gate, Wakefield. [X4892

). New Hudson, clutch model, 3-speed gear, J.A.P. engine, Bosch mag., perfect going order; £22, or offer.—Pattullo, Higgs and Co., Lower Orpington. [5464

16 6h.p. New Hudson Combination, 3-speed countershaft gear and all accessories, as new; -K. J. Shelley, Manor House, Tittensor, Stoke-on-. [5560

New Imperial.

OW Bros., Guildford.—New Imperial, all models new and second-hand, in stock. [5371

W Imperial-Jap. 8h.p., 3-speed War Model combination; 109 gns.; delivery from stock.—Exete r Cycle Co., Ltd., Bath Rd., Exeter. [3521

16 2¾h.p. 2-speed New Imperial-Jap, Stewart trip speedometer, Baby Klaxon horn, run 800 miles; 1915 Auto-Wheel, little used.—Box L6,200, c/o *Motor Cycle.* [5216

ERIAL-J.A.P., 1916, 2-speed countershaft, chain-cum-belt drive, done under 1,000 miles since new, ometer, all accessories; £30.—18, South Bruton , Bond St., W. [5557

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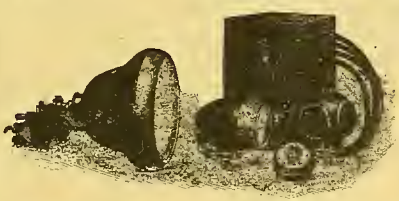

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NEW Imperial Motor Cycles, 2 speeds, clutch and kick starter and lady's models in stock for immediate delivery; trade supplied; no permits required. —P. J. Evans, 91, John Bright St., Birmingham. [4948

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NORTON Big 4, all-chain drive Military Model; £82. —Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3524

3½h.p. Norton, Brooklands T.T. Model, 1916 machine, fast and perfect, includes accessories; £59; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5591

NORTON, 1916, 3½h.p., 3-speed Sturmey countershaft gear, just been overhauled, and like new; £55.—Maudes', 100, Gt. Portland St., London, W.1. [5570

3½h.p. T.T. Norton, 1915, purchased new 1916, just overhauled, re-enamelled, condition perfect everywhere, accessories; 40 gns.—333, Norwich Rd., Ipswich. [5486

NORTON, late 1916, 3½h.p., T.T., almost as new, unused last 18 months, speedometer, lamp set, rear light, warning signal, fully equipped, perfect, special machine; 55 gns.; take good typewriter part.—Rinkside, Penrhyn Rd., Surbiton. [5459

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1915 N.U.T., 2¾h.p. twin J.A.P. engine, overhead valves, 3-speed gear, lamps and accessories, T.T model, very fast, and in beautiful order throughout; price £40.—R. Bamber and Co., Ltd., 33 Liverpool Rd., Birkdale, Lancs. Tel.: 44. [4857

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O.K., 1915, 4-stroke, 2 speeds, new tyres, lamp, and horn; a bargain, £20; hardly been used.—Maudes', 100, Gt. Portland St., London, W.1. [5569

P. and M.

P. and M. and Sidecar, 2-speed, engine overhauled, recently re-enamelled; £18; after 6.—19, Dollis Rd., Finchley. [X4770

P.F.

P.F., 3½h.p., Amac carburetter, Bosch mag., spring forks, good order; £6, or offer.—P. Willcocks, Datchet, Bucks. [5472

Precision.

25 Gns.—4¼h.p. Precision, Grado gear, variable, overhead valves, Bosch, Druid forks, new tyres and belt, pan saddle, etc.—Miller, 62, Hampstead Rd., N.W.1. [5555

Premier.

2½h.p. Premier, excellent condition, Bosch mag., B. and B., Druids, Clincher studded; £12/10.—Lovatt, 9a, Brightwell Crescent, Tooting. [5536

Radco.

RADCO, 2-stroke, 2-speed, good appearance, very little used; £18/10.—Haslemere.—Box L6.284, c/o *The Motor Cycle.* (D) [5492

MOTOR CYCLES FOR SALE.

Rex.

REX, 3¼h.p., accumulator ignition, in good running order; 70/-.—77, Acre Lane, S.W.2. [5564

REX, 2-speed twin, £18/10; Rex 6h.p. twin, m.o.v., £18/10; 1913 2-speed 6h.p. Sidette, £36.—Motor Exchange, Horton St., Halifax. [5500

Rover.

1914 3½h.p. 3-speed Rover, lamps, horn; £38.—Parker and Son, St. Ives, Hunts. [5584

ROVER.—All new models supplied; also 3½h.p. 3-speed, £33; E.P. or exchange.—Service Co., 292, High Holborn, London. [X4730

1916 Rover Combination, perfect, new condition, accessories; £58, offers; exchange.—24, Beauval Rd., East Dulwich. (Appointment.) [5541

ROVER 3½h.p. Motor Cycle, Sturmey J.S. 3-speed gear, just as new, unscratched; £35/10; send for photograph.—20, Forrest St., Latchford. [5517

1914 3½h.p. Rover, 3-speed, new Bates tyres, £25; also 1913, as above, £24; both machines in excellent order.—Trevers, Colin Park, The Hyde, Hendon. [5551

1916 Rover, 3½h.p., 3-speed countershaft model, kick starter, complete with lamps, horn, etc., also 12 gn. Montgomery sidecar, excellent condition.—Apply, G. Sibley, 5, Cheapside, Taunton. [5491

ROVER Motor Cycles, 3½h.p. and 5-6h.p. models, in stock for immediate delivery, both solo and sidecar outfits; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [4946

Royal Ruby.

ROYAL Ruby.—All new models supplied; 2-stroke, also single-speed, appearance and condition as new; £22; E.P. or exchange.—Service Co., 292, High Holborn, London, W.C.1. [X4731

Rudge.

RUDGE, 1914, 3½h.p., 2-speed, F.E., sidecar; 28 gns.—53, Swaffield Rd., Wandsworth, S.W. [5529

RUDGE Multi, 5-6h.p., with coach sidecar, very powerful; £45.—Motor Exchange, Horton St., Halifax. [5499

RUDGE, 3½h.p., special model, all accessories, including speedometer, £24; Rudge, 1913 3½h.p. Multi, £26; ditto, 1913-14, 3½h.p. Multi, all accessories, but requires overhauling, all parts complete, £17, a great London, W.1. Tel.: 552 Mayfair. [5573

Scott.

SCOTT Engine, forks, tank, wheels, tyres, chains, gear parts, Bosch mag., Brooks saddle, Binks, all in good condition; offers.—King, Gladstone Rd., Cheltenham. [X4897

Singer.

1914 Singer, 2¾h.p., 2 speeds, clutch, in excellent condition; price £27/10.—Gibbs, Fawcett St., York. 'Phone: 400. [X4842

Sparkbrook.

1917 (late) Sparkbrook, 2¾h.p., 2-stroke, 2-speed gear, usual accessories, only used short mileage, absolutely as new; bargain, price £30.—R. Bamber and Co., Ltd., 33, Liverpool Rd., Birkdale, Lancs. Tel.: 44. [4855

Sunbeam.

SUNBEAM, 1915, 3½h.p., countershaft, 3-speed, kick starter, mechanical horn, coachbuilt sidecar, £65. Also 6h.p. combination, £75.—Service Co., 292, High Holborn, London. [X4738

3½h.p. Sunbeam, 1917 T.T. roadster model, double tank, war machine, 3-speed countershaft gear, includes Lucas best accessories, not ridden over 1,000 miles; £77/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5601

SUNBEAM 8-10h.p. Combination, 1917, latest war model, not used 100 miles, and equal to new in every respect, handsome sidecar, complete with lamps and tools, and luggage carrier; price £135.—Rowe, 140, Church Rd., Hove. [5516

8h.p. Sunbeam Combination, 1916, thoroughly overhauled, splendid condition, 60 m.p.g., done 4,019, miles, Watford speedometer, Miller head set, Lucas rear, all tools; view 37, Sheet St., Windsor; enquiries answered.—Capt. Parratt, Walton-on-Naze. [X4766

T.D.C.

1917 2¾h.p. T.D.C., 2-stroke, special demonstration model, only ridden few miles, perfect; £24.—4, Gaywood Rd., Walthamstow. [5539

Triumph.

TRIUMPH, 3½h.p., 1912, 3 speeds; 20 gns.—77, Acre Lane, S.W.2. [5565

1911 3½h.p. Triumph, T.T. engine perfect, heavy Dunlops; any examination; £15.—9a, Brightwell Crescent, Tooting. [5537

TRIUMPH 1914 Coachbuilt Combination, fully equipped; seen near London; £33.—Write Box L6,292, c/o *The Motor Cycle.* [5562

TRIUMPH, 3½h.p., £17/10; 1912-3, Bosch mag., S.A. free-wheel clutch, £26/10; E.P., or exchange —The Service Co., 292, High Holborn, W.C.1. [X4723

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Triumph.

TRIUMPH, 1913, 3½h.p., Roc 2-speed, free engine, Bosch mag., good order; must sell; what offers? —Humphreys, Gwynfynydd Farm, Genllwyd, Dolgelley. [5460

TRIUMPH, 1914 model, 4h.p., 3 speeds, complete with brand new Montgomery coachbuilt sidecar, and all accessories; £50.—Maudes', 100, Gt. Portland St., London, W.1. [5571

AIR Mechanic must dispose of 1916 countershaft Triumph and best Gloria sidecar, lamps, horn, etc.; this is a splendid outfit, and genuine bargain at £80; seen London.—Box L6,287, c/o *The Motor Cycle.* [5493

TRIUMPH, 1910, 3½h.p., free engine, Philipson pulley, Bowden control, fixed 1917, nice wicker sidecar, with waterproof apron, box fitted on chassis of sidecar (colour to match), with travelling bag inside for spares, etc., special petrol tin, Cowey speedometer, horn, tools, watch, two new Lomax toolbags, A.I. mud and wind screens fitted 1917, two new lamps on cycle (once lit), lamp on sidecar, three new Dunlop covers, heavy on back and sidecar, new belt, all fitted 1917, many spares, including three covers, two Clinchers, one Avon, two new tubes (Dunlops), never been used, new valve, new Lodge plug, belt, belt fasteners, etc., petrol soldering bolt, in splendid condition, been well kept; nothing wanting to make it perfect, magneto rubber covered, mileage 9,891, never used 1912-13, or since April, 1917; no offers; £42.—Neave, 135½, East High St., Forfar. [5466

Zenith.

ZENITH-GRADUA, 1915, 4h.p. twin, T.T.; £36; exchange entertained.—5, Victoria Av., Surbiton. [X4889

ZENITH, Gradua gear, Jones speedometer, and horn; £45; E.P. or exchange.—Service Co., 292, High Holborn, London. [X4733

ZENITH Combination, 8h.p., hood, screen, good condition; bargain, £33/10.—G.H., 168, Green St., Forest Gate, Essex. [X4898

1917 3h.p. Zenith, countershaft model, kick starter, and free engine, complete with all accessories, twin-cyl. J.A.P. engine, very fast, in good sound condition; £57/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5594

Miscellaneous.

JAMES, 1915, 2¼h.p., 2-stroke, 2 speeds, excellent condition; £32.—See below.

JAMES, 1916, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £36.—See below.

JAMES, 1917, 2¼h.p., 2-stroke, 2 speeds, lamps and horn; £40.—See below.

JAMES 1915 4¼h.p. Combination, 3 speeds, clutch, and kick starter, all-chain drive; £60.—See below.

ROYAL Enfield, 1916, 2¼h.p., 2-stroke, 2 speeds, lamps, and horns; £38.—See below.

ROYAL Enfield Combination, 1916, 6h.p., lamps, horn, and speedometer; £78.—See below.

DOUGLAS, 1910, 2¾h.p., lamps and horn; £15.—See below.

DOUGLAS 1913 2¾h.p., Model V, head light, rear lamp and horn; £28.—See below.

DOUGLAS Combination, 1915, 4h.p. Lucas lamps and horn Stewart speedometer and warning signal; £63.—See below.

WOLF-J.A.P., 1915, 2½h.p., countershaft 2-speed gear; £20.—See below.

ALLON, 1915, 2¾h.p., 2-stroke, excellent condition; £25.—See below

ALLON, 1916, 2¾h.p., 2-stroke, excellent condition; £30.—See below.

ALLON, 1917, 2¾h.p., 2-stroke, 2 speeds; £40.—See below.

CALTHORPE, 1915, 2¼h.p., 2-stroke, 2 speeds, lamps, and horn; £27.—See below.

RUDGE, 1916, 3½h.p., Multi gear and clutch, lamps and horn; £42.—See below.

TRIUMPH, 1910, 3½h.p., T.T. model, speedometer; £20.—See below.

PREMIER, 1913, 3½h.p., countershaft gear and clutch, fitted with coachbuilt sidecar; £38.—See below.

PREMIER, 1913, 3½h.p., and tradesman's side-carrier, 3 speeds, clutch, and starter; £50.—See below.

PRECISION, 1915 4h.p. twin, 2-speed countershaft gear; £35.—See below.

NEW Imperial-Jap, 1915, 2¾h.p., 2-speed model; £27.—See below.

CLYNO Combination, 1914, 6h.p., hood, screen, detachable wheels and spare wheel, complete, lamps, horn, and speedometer; £62.—See below.

A.J.S., 1912, 6h.p., 2-speed countershaft gear, clutch and kick-starter, and Gloria coachbuilt sidecar; £35.—See below.

INDIAN 1914 7h.p. Combination, spring frame, dynamo lighting, electric starter, horn, speedometer, etc.; £60.—See below.

ALL the above motor cycles are ready for immediate delivery, and deferred payments can be arranged for any of them.—Write for further particulars and list B. 22 to the Eastern Garage Co., 418, Romford Rd., Forest Gate, E.7. Telephone No.: East Ham 490 T.A.: Egaraco, London. [5577

WELL and truly made from forged steel, "King Dick" Spanners grip "fair and square." They cannot burr a nut when properly adjusted. Famous for 35 years: guaranteed for ever. Four sizes, 3in. to 9in.

See that your spanner is stamped with the Bulldog mark here shown—the mark of the genuine "King Dick."

Orders dealt with as Government requirements permit.

ABINGDON ECCO, LTD., Tyseley, BIRMINGHAM.

London: G. H. Smith, 12 Mortimer St., W.

MOTOR CYCLES FOR SALE.

Miscellaneous.

FOR Sale, two machines, Chater-Lea combination, 8h.p., coach sidecar, thorough good machine, cheap; also Douglas, 2¾h.p., very cheap.—270, High Rd., Chiswick. [5485

SEVERAL Late Model Lightweights and Combinations in stock, fully equipped, at reasonable prices. Write us your requirements.—Mebes and Mebes, 154-6, Gt. Portland St., W.1. Tel.: 3426 Mayfair. [5582

MOTOR Agents.—I have in stock for immediate delivery one hundred new motor cycles, Rover, New Imperial, Calthorpe, James, Connaught, and Hockley. No permits required. Let me quote you.—P. J. Evans 87, 89, and 91, John Bright St., Birmingham. [4949

JOINED Up.—But only three motor cycles left (lots of cars); 1914 Douglas, 2-speed; 1913 Scott combination, low underslung sidecar; 1914-15 4h.p. New Hudson 3-speed combination, £25 cash; no offers.—Douglas S. Cox, Motor Clearing Expert, 6c, Lansdowne Hill, West Norwood, S.E. (See Cars.) [5544

BARGAINS.—7-9h.p. Harley-Davidson combination, £59/15; 1916 Harley-Davidson 7-9h.p. combination, electrically equipped, £80/15; 1915 Harley-Davidson combination, £69/15; 1915 4¼h.p. B.S.A., with B.S.A. sidecar, £56/15; 1914 4¼h.p. B.S.A. combination, £45/10; 3½h.p. B.S.A., 1913, £15/15; 1914 6h.p. Zenith, countershaft gear £33/10; 3½h.p. Rudge, 1912, Grado gear, £18/15; 4h.p. Bradbury, 1911, Grado gear, coach sidecar, £21/10; 6h.p. Rex, 1909, £12/15; 3½h.p. Rex, 1910, £12/15; 3½h.p. Humber, 1911, 2 speeds, £18/15; 6h.p. Rudge, 1913, Multi gear, £29/15; 2½h.p. T.D.C., 1914, £12/15; 2¾h.p. T.D.C., 1915, £13/15; 2¾h.p. T.D.C., 1916, £15/10; 2¾h.p. Sun-Villiers, 1914, £14/15; 1910 Douglas, free engine, £14/15; 3h.p. Minerva, mag., £6/15; 3½h.p. Excelsior, £3/19; 1914 Crouch car, detachable wheels, £65. Send for detailed list.—Booths Motories, Portland Place, Halifax. 'Phone: 1062. [5228

BODIES.

CLEARANCE Lines.—Large stock cane sidecar bodies offered, stock soiled only; low prices.—Willowbrook Co., Leicester, [0901

PHŒNIX Coach, wicker, cane bodies, single end tandem models in all colours; largest selection in the trade; several stock soiled to clear; repairs, repainting, and re-upholstering a speciality; actual manufacturers —Phœnix Sidecars, 736, Holloway Rd., London. [2334

SIDECAR Body Designs for the trade only. Working, coloured, pencil, or line drawings of original designs, also working drawings full sized or to scale.—Cooper's Vehicle Journal, Ltd., established designers to the coach trade for over 80 years Consult us when designing new ideas.—20, Tudor St., London, E.C.4. [0818

SIDECAR ATTACHMENTS.

BASTONES for Sidecars and Bodies at low pric
228, Pentonville Rd., King's Cross, London,
[5

THE Willowbrook Co., Leicester, solicit your enqu
for sidecars of all descriptions. Write for i
trated catalogue. [0

COACHBUILT Sidecar, couplings complete,
sound condition; £3, or nearest offer.—Willi
8, Aston Rd., Wem. [5

UNDERSLUNG Coachbuilt Sidecar, suit 4h.p., s
did condition; £5/10; exchange push bikes.—
Blair St., Poplar, E.14. [5

DE LUXE Coachbuilt Sidecar, suit big twin, sp
wheel; cost £25; nearly new; sacrifice £9;
change push bikes.—113, Blair St., Poplar, E.14. [5

NEW Underslung Chassis, latest model, with all
tings, £5/15; new lightweight chassis, £3/5;
sidecar, complete, 35/-.—Booths Motories, Halifax. [5

PHŒNIX Sidecars, new and second-hand; also se
new stock soiled to clear; 100 complete side
always in stock; list free.—Phœnix Sidecars, 736,
loway Rd., London. [2

HOODS, WIND SCREENS, ETC.

PHŒNIX Manufacture Hoods from 35/-, screens 1
Immediate deliveries; special list.—Phœnix,
Holloway Rd., N. [2

WIND Screens.—The Standard, 27/6; folding
32/6; double side wing screen, 45/-; the F
28/6; the fixed, 19/6; the Orto, 31/6, 52/6, and 5
Bluemels, 42/-; the Walbro, 36/-; fawn waterp
hoods, with strong wood frames and plated fittings, 3
42/6, and 54/6.—Juno Showrooms, 248, Bishopsg
London. [2

CARS FOR SALE.

1914 Perry 2-seater, hood, screen, lamps, etc.; £
—Motor Exchange, Horton St., Halifax. [5

1915 2-seater Calthorpe, hood, screen, lamps, s
wheel and tyre; £185.—Motor Exchange, Ho
St., Halifax. [5

G.W.K. Car, 8-10h.p., hood and screen, recently
holstered, in good order; £120.—Bowler, 1
Nottingham Rd., Loughborough. [X4

IN Khaki. And they say I look awfully well in
But I still have some bargains left for absol
clearance. Call over and see them, and if I am
there Manager Inman will give you every attent
and incidentally you can probably buy cheaper f
him than you would from me.

GRADE One. Like me.—Late model Autocarrier
wheel parcel car, Sankey wheels, watertight m
about 1914, worth £65, bargain, £25; 18h.p. Wols
1-ton van, gate, dual, Smith carburetter, running o
£25; Scott, Douglas, and New Hudson motor cycles,
each; 15h.p. Talbot platform lorry, 4-speed gate, d
pulls well, £35; 16-20h.p. N.A.G. ton van, Bosch,
carburetter, gate, smart roomy body, £35; 25-
F.I.A.T. van, solids behind, Bosch, Claudel, £40.

ALSO Left.—14-16h.p. Ballot 4-seater, low flush-si
body, smart, pulls splendidly, £40; 20-30
Beeston Humber 1-ton van, Zenith, gate, £45; 15
1912 Studebaker, 4-seater, monobloc, gate, dual, sm
£45; 18-22h.p. Bedford-Buick light lorry, gate, d
good tyres, £50; 15.9h.p. R.C.H., 4-seater, monob
enclosed valves, Bosch, Zenith, smart car, runs w
£65; 20h.p. 6-cyl. Standard chassis, late model, Clau
£75; 12-15h.p. Hupmobile, sporting 4-seater, £
17h.p. live axle Daimler chassis, new tyres, Zen
£75; 15h.p. racing car, actual Brooklands winner,
m.p.h., £75.

LEFT, Right.—Good little Ford van, extra roo
body, separate watertight mag., runs nicely, £
1916 Trumbull light car, streamline 2-seater, £80; 1
h.p. Gregoire chassis, gate, Zenith, raked steering, so
box sit-upon included (don't mention it), £85; Ber
2-ton chassis, 12ft. wheelbase, twin solids, wants a li
doing up, £85; specially smart little Perry light
detachable wheels, 40 m.p.g., runs splendidly, £1
10h.p. 1914 Lagonda coupe, streamline, detacha
wheels, 4-cyl. monobloc, worm, smart, £120; 11.9
1917 Argo, sporting streamline 4-seater, equal n
4-cyl. monobloc, dynamo lighting, electric self-star
electric blue, electric price, £125.

PARTICULARLY Right.—1914 20-30h.p. Studeba
six chassis, 6-cyl. monobloc engine, dynamo
electric starter, detachables, exceptional condition, wo
double, £150; 11-18h.p. 1914-15 Brennobor streaml
3-seater, detachable wheels, monobloc, seat starter,
m.p.g., runs beautifully, worth double, £150; ex
special Ford torpedo ¾ landaulet, luxurious Ro
Royce 7-seater body, round back, curved roof, poin
radiator, bargain, £150; 12h.p. Siddeley-Deasy torpe
4-seater, worm drive, enclosed valves, detachable whe
£150; 20h.p. Rolls-Royce 1-ton platform lorry, 4-sp
gate, detachable rims, runs beautifully, £185; 11.9
(12-15h.p.) 1914-15 Calthorpe, streamline 4-seater,
voit Rotax dynamo lighting set, detachable wheels,
radiator, particularly smart, £225; 3½-ton De D
chassis, about 1914, latest round radiator type, 10
140 enclosed valve engine, worm drive, steel whe
worth double, £385.

DOUGLAS S. COX, The Motor Clearing Expert,
Lansdowne Hill, West Norwood, S.E., has all
above actually on view. Please call. Hours 9 to
weekdays. No business Sundays.

NOTE.—As I shall be busy for a few weeks winni
the war, Mr. Harold Beasley, late of Mesopotam
my works manager, will show you every attention, wh
Mr. Seymour Inmon will attend to correspondence. [55

THE MOTOR CYCLE
ESTABLISHED IN 1903
A posse ad esse
AND FOR OVER SIX YEARS THE ONLY PAPER SOLELY DEVOTED TO THE PASTIME

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The Development of the Motor Cycle.

IT is interesting to speculate how far the motor cycle will have been improved, say, twelve months after the cessation of hostilities. By that time manufacturers should have supplied some of their post-war models to customers. In this short article we do not intend to prophesy concerning detail improvements, and it suffices only to say that improvements are necessary, and are demanded by the *cognoscenti* of the motor cycle world.

Our contributor, Mr. Francis E. Schofield, in his able article "The Trend towards Mechanical Luxury," was clearly on the right lines when he showed how rapidly the motor car developed in comparison with the motor cycle. The question is one which makes an interesting study. Why, for example, when the motor car was comfortable, silent, and absolutely reliable, had the twin-cylinder motor cycle of that period automatic inlet valves, more often than not a single gear, and a hit-and-miss system of lubrication? The answer may be because the motor cycle was then evolved chiefly by pedal cycle makers, who were not engineers, but people who treated the motor cycle not as a real engineering proposition, but as a bicycle with an engine hung on to it; because motor cyclists, not having had car experience in many cases, did not know enough to demand obvious improvements; because manufacturers, who must have known at the time what was required, wisely, from their point of view, altered their designs as little as possible, for their products, crude as they were, sold as fast as they could be manufactured.

But this war has taught us a great many things. Is it likely that the enthusiastic motor cyclist who was content with a single-geared two-stroke in 1914, but has driven a staff car during the war, will be content when he returns to his beloved two-wheeler to ride a vehicle which makes an unnecessary noise, smears his clothes with oil, and cannot be restarted on a steep hill if brought to a standstill through the exigencies of traffic? We know, of course, that most modern machines are far more highly developed than this particular type, but the type existed, was sold, and, we believe, enjoyed by those who did not know the delights of anything better. No one will pretend that the up-to-date pre-war machine was perfect, good though it undoubtedly was, and we feel sure that, after all the war has taught our cleverest engineers, the post-war machine will be a very different proposition. Clever brains, we know, are busy plotting out new designs, and not a few of the most promising plans have actually first seen the light in depots within sound of the enemy's guns.

Commercial Post-war Aspects.

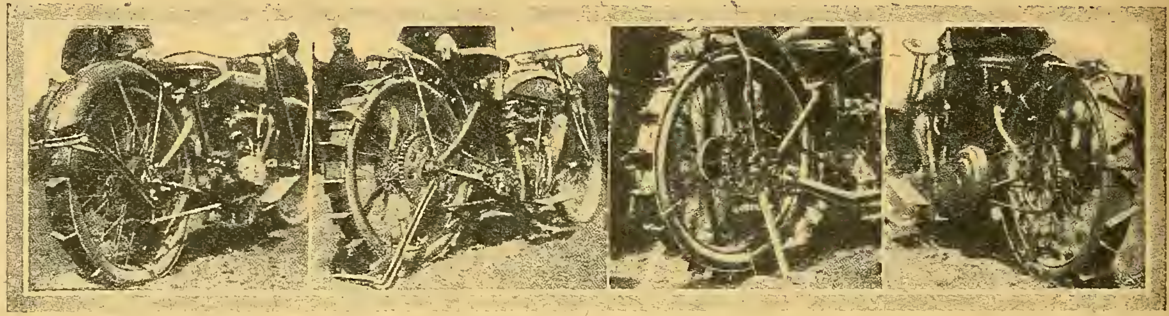
So much depends on our ability to increase our exports after the war to enable us to recover from the ravaging effects of the struggle on which we are now engaged that it is clearly the Government's duty to encourage every industry as much as possible, to foster a limited amount of experimental work, and, at the earliest possible moment, to remove the fuel ban and to enable cheap fuel to be supplied to the public as a detail of its encouragement of our particular industry.

The Ministry of Reconstruction is fully aware of this necessity, and, as we pointed out last week, is intending to help manufacturers in their experimental work. At the present time we hold the lead in the manufacture of motor cycles. No other nation can even approach us in this particular direction; and it is a lead which we must keep. Our machines, therefore, must continue to be the best, and must be sold at a price in the Overseas Dominions which will compare favourably with that at which makes of other nations can be bought in those far away portions of the Empire. Our manufacturers *can* rise to any occasion that may arise, but only with Government assistance. It is up to them to show the Government what they can do, and up to the Government to enable them to do it.

An index to the advertisements in this issue will be found on the page facing the back cover

AN AMERICAN HILL-CLIMB.

A Spectacular Event witnessed by 9,999 People according to the American Report.



Some of the treads which were fixed to the rear wheels of competing machines. The varied designs of these "tractors" show that each rider had his own peculiar idea as to the best means of gripping the surface

A HILL-CLIMB was recently held on Capistrano Hill in California. This is no more than a bald statement of fact, but apparently it is paradoxically untrue because the climb was not a climb at all, but only an attempt at the impossible, although, judging from the description of the event in *Motor Cycling and Bicycling*, any failure in the realisation of fact about the climb was more than compensated by the reality of the hill itself. This is how the American report conveys to the reader the fact that the hill was rather on the steep side:

"This Hill it was a Hill."

"If Capistrano could be dug up and transplanted in Kentucky, some gink with a million dollars would beneficently construct a cog-wheel railway up to the top so's the inhabitants could get a view of the Gulf of Mexico. See here—this hill I'm talking about is so steep that a coyote's legs would have to be twice as long on the downhill side as they were on the uphill side in order that this coyote I'm talking about could travel around this hill—sideways.

"Capistrano Hill starts practically at the roadside. From there it mounts upward in a graceful curve, of the order parabola, and finally sweeps into tangency with the hypothenuse of a 37° triangle, near the top. 37° is 75%. And a 75% grade is a grade with a rise of 75ft., vertically, in every 100ft. horizontally. If you understand what that means, you're that much better educated than somebody else who don't understand what that means. Anyhow, by this time, you're beginning to realise that 'this here hill' is some hill. And that's precisely the information I've been tryin' to pound out of this typewriter.

"Subtract one from ten thousand. Then the remainder is the number of people who witnessed this year's motor cycle bombardment of San Juan Hill."

One of the competitors on a steep portion of the slope. Some idea of the steepness can be gathered from the photograph, which is not faked as to its angularity. (*Inset.*) A remarkable photograph of a machine which did a somersault backwards.

Results (?)

Details of the event are not given—presumably the scribe was too occupied with making sure that none of his readers should overlook the fact that "this here hill" was a hill. The illustrations we reproduce show that some of the competing machines had weird and wonderful gripping apparatus clamped to the rear wheel, and the result of these fittings was the churning up of the hill surface—there is no made road up the hill—to such an extent that the motor cycles soon embedded their back wheels in the ground, and not only became helpless, but made the path impassable for those to follow. The result of the event—which can only be conjectured among the mass of Americanese in which the meeting is described—appears to have been that none of the machines succeeded in climbing the hill on the marked out track on account of its churned up surface, but that, after the official event was over, four machines climbed the hill along a path parallel to the official one where the surface had not been churned so severely.

What do our readers think of it all? We must confess for ourselves that, what with the coruscations of the language and the "tractors," we feel somewhat befogged.

Occasional Comments by "Ixion"

The Answer is a Lemon.

I SEE a query in a recent issue about the "suction" which the descending piston exerts on the carburetter. A Service acquaintance (an ex-motor cyclist) tells me that one of his worst trials in the M.T. is that he is no longer allowed to talk about suction, and, if the fatal word escapes his lips or pen, his instructors begin to make opprobrious remarks about lemons. He is commanded to talk about "depression," and to inform recruits that the petrol is not sucked out of the jet by the pistons, but pushed out by the petrol in the float chamber, as there is atmospheric pressure on one end of the column of petrol, and a "depression" at the other end. A rose by any other name would smell as sweet: but it is trying work to pick up a new lingo.

The German D.R.?

CAN any D.R. in the B.E.F. oblige us with any particulars about the Hun despatch riders, the only Boche technical corps of which the Allied press gives us no information? Are they riding latest model N.S.U. machines, or what? Singles or twins? What is the specification, and so forth? I am not supposing that we have captured any of them lately, but surely we collared a few during our offensive stunts in the past; and the Hun press ought to contain a little information, if only of a snapshot type. I am still as ignorant as I was in 1914 as to how Fritz's despatch riders are organised, and what their mounts are like. When the R.A.F. bring down a Hun plane, a full technical report is promptly published for the information of the British trade and Services. I doubt whether Fritz can teach us anything about motor cycles, but we should all be interested to know how his queer brain is working in that line. To judge from the deathly silence which has governed this topic since the late autumn of 1914, one would imagine that there were no longer any Boche D.R.'s. I have heard a yarn that Fritz employed tandem-seated Adler cycle cars on the narrow mountain tracks in the Serbian campaign, and since then not a word about his light motor auxiliaries has reached me. Perhaps he has followed a policy popular in other quarters, and copied the Triumph. Has he any Waacs and Wrens and Penguins driving motors for him, and does the haughty Prussian officer ever condescend to sit in a sidecar?

Cowling-in the Engine.

STILL another original suggestion is directly inspired by aeroplane experience. Some of us were conning the first bound volume of *Flight*, and comparing the naked works of the early Wright and Rumpety aeroplanes with the neatly cowled engines and cockpits and fuselages of to-day. From this contrast the talk wandered to the somewhat similar contrast between early Panhard road racing cars and a modern Brooklands flier. Finally, we diverged into motor cycling topics, and somebody asked whether we could not secure actual gains alike in cooling and speed by cowling-in the power unit of a motor bicycle? The 1¼ h.p. Motosacoche achieved this ideal in an unbeautiful way. It is conceivable that the entire "works" of a 3½ h.p. machine might be hidden inside a light cowl formed on quick detachable metal panels. An elliptical opening at the front would collect nearly as great a volume of cool air as impinges on a naked engine, and might distribute it more evenly over the fins than complete exposure allows. Wind resistance would be slightly reduced, if anything. So far as externals go, the machine could be cleaned with a hose, and if a certain amount of dirt penetrated into the cowl it would include very little mud. The additional weight would be negligible. Given an oiltight engine, cleaning of the bristly parts would be merely a matter of dusting.

Sound Design.

I CONTINUE to receive occasional grumbles from resentful inventors whose engines have been turned down by Government experts. Far be it from this dust of earth, as the Babus say, to claim omniscience, and further still to pretend that a British Government is infallible. Let me rather try to smooth ruffled plumage by suggesting that quite a number of features are essential in an engine to which a Government at war can play foster-father: and that several vital factors may be missing in an engine which is, nevertheless, a credit to its papa. For example, such an engine must be—(1.) Easily manufacturable by unskilled labour and on machines of common occurrence. (2.) Adaptable to the national aeroplane programme. (3.) Better than any similar engine already adopted. (4.) Practical in all its details, as well as satisfactory in general outline. I got a Service friend to have one or two investigations made with regard to complaints which struck me as rational, and in each case the official "No!" was demonstrably justifiable.

Why he Loves a Two-stroke.

I HAVE just been interviewing an ardent two-strokist, a motorist with a bigger mileage behind him than most of our readers. I asked him to state for our benefit why he plumped for an engine which is in rather general disfavour. He produced several reasons. It always starts in ten yards without any running or pushing, it fires at walking pace, and it is so light that he can move it about with no more exertion than wheeling a push bicycle. Moreover, he can carry it up steps, or prop it against a wall, or lift it over a kerb with little more effort than it takes to put an umbrella in a hatstand; if anything goes wrong, it is sure to be the sparking plug, so it sets him no problems. Lastly, it is so cheap that he does not mind leaving it out in the wet or neglecting to clean it oftener than once a month, and if he gets tired of it or should happen to "crash" it, he cannot be very badly out of pocket.

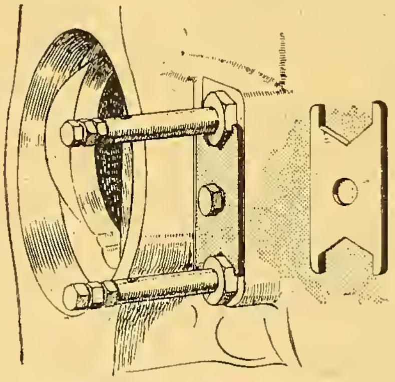
THE RALEIGH ON THE ROAD.

A Short Trial of the Raleigh 5 h.p. Flat Twin and Sidecar.

The new 5 h.p. Raleigh flat twin outfit, with Mr. William Comery, chief engineer of the Raleigh Cycle Co. and designer of the machine, in the saddle.

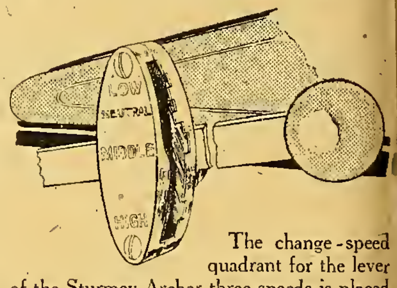
THE space at our disposal last week permitted us to touch only somewhat briefly upon the salient points of the Raleigh flat twin, the engine of which we illustrated on April 11th last. Such unimportant details as the colour of the enamel had perforce to remain unrecorded, but we may say here that the finish of the machine was decidedly neat and attractive. The tank, by the way, is *not* cylindrical.

The engine is rated nominally at 5 h.p., but, as is usually the case, the nominal power falls far short of the actual. The object of the designer was, we understand, not so much high speed and colossal revolutions as a thoroughly flexible and controllable engine capable of propelling either a solo machine fast enough for any road work or a sidecar outfit for general touring purposes.



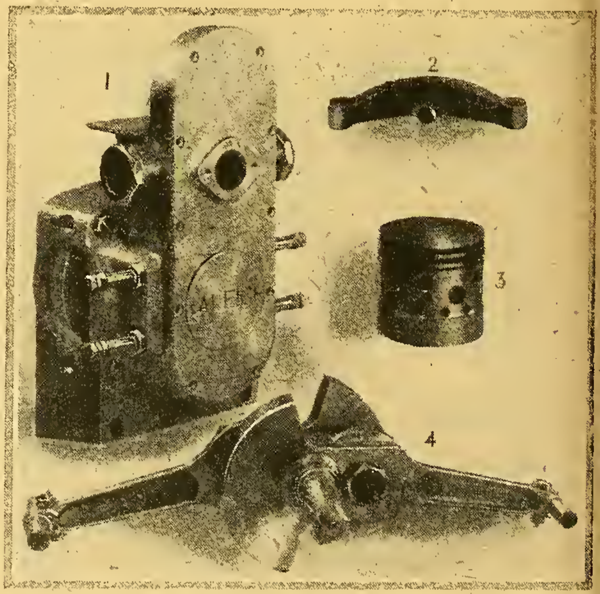
A neat method of fixing the valve tappets.

The experimental machine was geared for sidecar work, the ratios being 5½, 8, and 13 to 1 approximately; therefore a speed of 50 m.p.h., of which the machine is easily capable, means that the engine is turning over at 3,580 r.p.m. As an example of its flexibility we were assured by Mr. Comery that the machine had ascended a certain hill in the neighbourhood of Mapperley at 10 and also at 40 m.p.h. both on top gear and ridden solo. At first w thought the slow speed the more wonderful, for th hill had a gradient of 1 in 6, but after w had seen and climbed the hill, had noted its extremely rough surface and the nasty angle by which it is approached, and, further, the right-angled corner at the top, we were at a loss to say which performance was the more meritorious, for the faster speed shows enormous powers of acceleration.



The change-speed quadrant for the lever of the Sturmey-Archer three speeds is placed against the lower part of the tank.

We have already mentioned that an Amac carburetter was fitted; this, it is interesting to note, departs from standard in one small particular. The Amac carburetter, as our readers know well, is provided with an air scoop, which catches the air as the machine rushes through it and turns it into the air orifice. This is, of course, designed for the carburetter when in the usual position behind the engine. Now on a flat twin the carburetter must be placed sideways, and this scoop will lose some of its effective-



(1) The crank case casting, showing the arrangement of the inlet pipe through the timing case. (2) The bridge for holding down cylinders. (3) The drilled piston. (4) Showing crankshaft assembly. The gudgeon pins, it will be noticed, are a fixture in the rods.

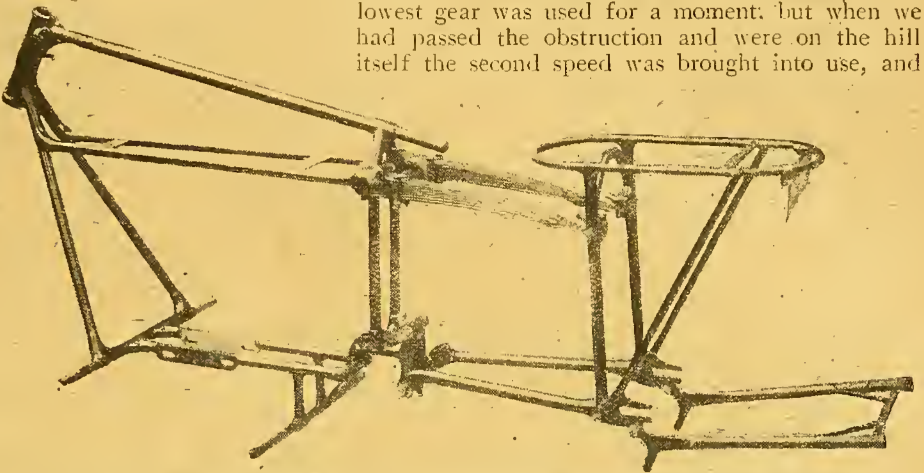
The Raleigh on the Road.—

ness. The centre has therefore been drilled out, leaving a hole about half an inch in diameter. This results in an increased air supply and more power—a fact which does not surprise us, for we are at present using a somewhat old pattern of this carburetter without the air gauze and getting the same results, but the carburetter has become far more sensitive to the position of the air lever, and can no longer be described as semi-automatic. This, however, is only a disadvantage in the case of an inexperienced rider.

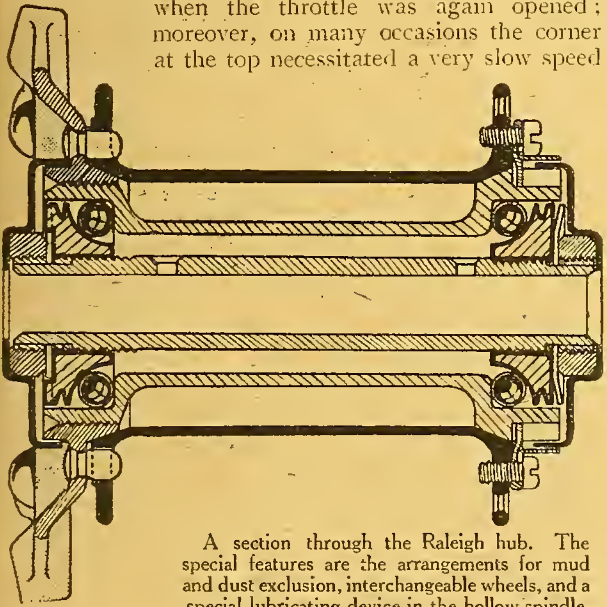
Before describing our trial we ought to mention that most ingenious arrangements have been made for the fitting of the chain cases, one of which, having to rise and fall with the rear portion of the frame, slides over the other, while a felt ring interposed between them excludes dirt, retains the oil, and prevents noise.

We had no need to go far from Nottingham to give the machine a thorough test in all save reliability, for the suburbs of that town abound with steep hills—not very long certainly, but the lack of length is made up for by the sharp corners by which they are approached, and in many cases by the roughness of their surfaces.

During our test we were very favourably impressed by the sweetness of running and wonderful flexibility of the engine, to which we have already referred. The sidecar fitted to the Raleigh was, for testing purposes, intentionally on the heavy side (160 lb.), but in spite of this the steepest hills (several of these have an incline of 1 in 6) were climbed with ease on second speed, and the engine had no difficulty in slowing for a sharp corner and accelerating rapidly when the throttle was again opened; moreover, on many occasions the corner at the top necessitated a very slow speed for the last few yards; the steady slow pulling was then delightful, and, in fact, more like that of a steam than a petrol engine.



The framework of the new Raleigh has double straight tubes throughout, with the exception of the top tank tube. It will be observed that the pivot carrying the rear part of the frame is situated as close as possible to the chain sprocket.



A section through the Raleigh hub. The special features are the arrangements for mud and dust exclusion, interchangeable wheels, and a special lubricating device in the hollow spindle.

Acceleration on Hills.

As we approached the steepest climb of all (a bit of 1 in 5.9), we found the way blocked at the lower corner by two carts and several children; and the lowest gear was used for a moment: but when we had passed the obstruction and were on the hill itself the second speed was brought into use, and the engine accelerated all the way up until the usual corner at the top required a reduction in speed. Turning round, we descended this hill at a gentle pace, an excellent test for the brakes. *We* did not test the pulling power of the engine *down* the gradient.

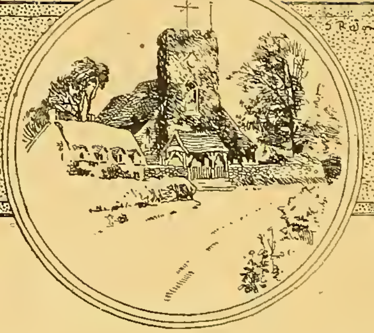
The machine was very quiet and possessed a good turn of speed—circumstances did not permit of this being much used—but what impressed us most was the remarkable flexibility. We ascended long slopes in a powerful rush and crept round corners all on top gear.

A Brooks B170 saddle, combined with the rear springing and Brampton forks, made the Raleigh motor cycle a most comfortable mount to ride, and the sidecar was in no way behind any of which we have had previous experience. We referred just now to reliability—that this is in no way lacking is proved by the fact that the engine has been running for fourteen months without any spares; in fact, no spares for this engine are in existence.

After this pleasant experience we are looking forward to a more extended trial, and also to a test of the machine as a solo mount.

TWO-STROKE ENGINES AND THE GARAGE HAND.

Practically all garage hands are well posted on four-stroke engines. It is only natural, perhaps, that these men assume the same degree of knowledge concerning the two-stroke. Usually, when a two-stroke owner calls at a garage to have some trouble remedied, the repair man goes serenely ahead. He does not realise that, owing to the fundamental difference in the principles of operation between the four-stroke and two-stroke, each must have its own operating characteristics, which must be carefully considered.



MOTION STUDY AND THE MOTOR CYCLE.

Interesting Facts suggested by W. G. Aston's Article, "Relative Motion," published in "The Motor Cycle on October 11th, 1917.

If my object in writing this article had been to impress the reader with the profundity of my scientific knowledge I might have chosen some such title as "The Kinematics of Motor Cycling." As, however, that is very far from my intention, I think it only fair to warn those numerous readers who are already well informed on the subject of kinematics that I have nothing fresh to tell them. The man whose eye I want to catch is he who is ignorant even of the meaning of kinematics.

Now most of us know something about motion study. We can scarcely have failed to have read of those ingenious American gentlemen who propose to revolutionise industry by showing the workman the very best and quickest way of doing his job, no matter what it may be. With this aim these experimenters have made a careful analysis of the motions required to perform certain operations, and they have produced diagrams representing the exact path traced out by a hammer head when driving a nail, by a golf club when striking a ball, and so on. Although this is not the particular aspect of motion study with which this article is concerned, it is one that is not without interest for the motor cyclist. There are not wanting optimistic scribes who foresee the day when touring motor cycles will sell at £15 or £20; but this state of affairs will only come when outputs of machines are reckoned in terms of great grosses, and when production is approached in that scientific spirit of which "motion study" is a manifestation.

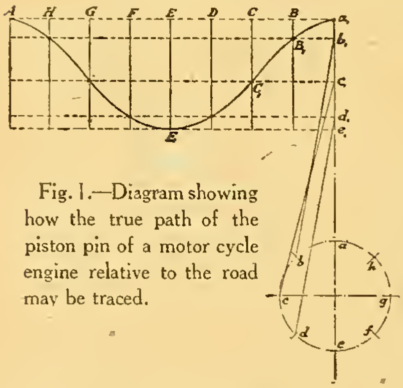


Fig. 1.—Diagram showing how the true path of the piston pin of a motor cycle engine relative to the road may be traced.

The Path of the Piston.

At present our purpose is merely to study the true motion of certain parts of a motor cycle, and for a first example the gudgeon pin of a single-cylinder machine may be taken. When the motor cycle is at rest, with the engine running but declutched, the piston pin travels up and down in a straight path. But as soon as the clutch is let in and the machine moves off along the road the pin now has a motion compounded of its original reciprocating movement and the horizontal travel of the whole motor cycle. It is not difficult to trace the precise path or "locus" of the selected point under these conditions. Assuming the gear ratio to be eight, and the wheel diameter to be 26in., then for each revolution of the engine-shaft the road wheel will make one-eighth of a revolution—that is, the horizontal travel of the motor cycle will be $\frac{3.1416 \times 26}{8} = 10.2\text{in.}$ In the diagram, fig. 1, this distance of 10.2in. is represented by the line a_1 A, while the vertical line $a_1\ e_1$ represents, to the same scale, the stroke of the piston. The crank pin circle a, c, e, g is divided into, say, *eight equal parts, and line a_1 A is subdivided correspondingly. The points b_1, c_1, d_1, etc., give the positions of the piston pin corresponding to the appropriate positions of the crank pin.

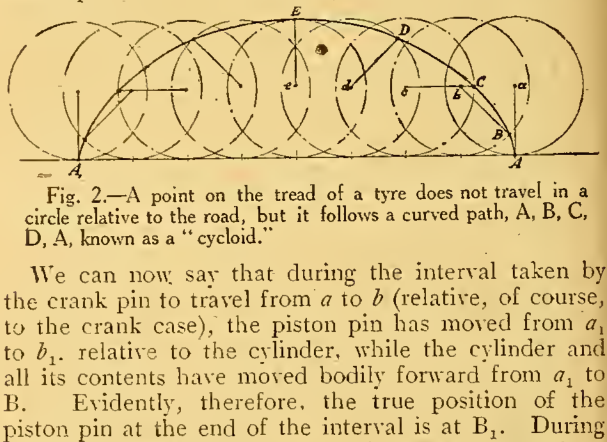


Fig. 2.—A point on the tread of a tyre does not travel in a circle relative to the road, but it follows a curved path, A, B, C, D, A, known as a "cycloid."

We can now say that during the interval taken by the crank pin to travel from a to b (relative, of course, to the crank case), the piston pin has moved from a_1 to b_1 relative to the cylinder, while the cylinder and all its contents have moved bodily forward from a_1 to B. Evidently, therefore, the true position of the piston pin at the end of the interval is at B_1. During the next interval the piston pin moves through a vertical distance equal to $b_1\ c_1$, and through a horizontal distance B C; hence, its real path is along the line $B_1\ C_1$. In a similar manner we can obtain other points on the curve, and eventually the line a_1, C_1, E_1 A is produced, which is the required path of the pin. The sequence of operations is repeated during succeeding revolutions of the engine, with the result that the locus takes the form of a sinuous curve of the type shown to a smaller scale in fig. 3.

A Rolling Wheel.

Another locus that it will be interesting to trace is that of a point on the tread of the tyre. Let us choose the point A, fig. 2, which is shown in contact with the road surface. After one revolution of the wheel this point again touches the road, at A_1, and the horizontal

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* It is merely a coincidence that the number of divisions, eight, should be the same as the gear ratio.

Motion Study and the Motor Cycle.—

distance from A to A_1 is equal to the circumference of the tyre = 3.1416 × 26in. = 81.7in. Dividing this distance into equal spaces, say eight, we see that the points *a*, *b*, *c*, *d*, etc., represent the successive positions of the centre of the wheel for each eighth of a revolution. In the initial position of the wheel the spoke *a* A is vertical. After one-eighth of a turn the centre of the wheel is now at *b*, and the spoke assumes an angle of 45°. Its outer end will therefore be at B. Similarly, after a quarter of a turn the wheel centre is at *c*. The spoke will have turned through a right angle, and the selected point on the tyre will be at position C. We thus obtain the curve A, C, D, E, A_1 as the locus of the point in question. The mathematical name for this curve is the "cycloid."

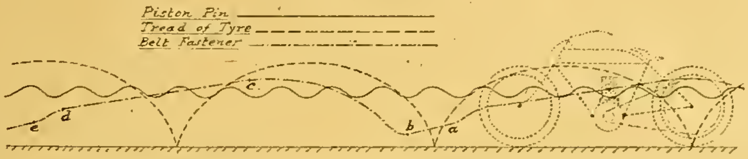


Fig. 3.—This diagram shows correctly to scale the exact paths traced out by the piston pin, a point on the tread of the tyre and the belt fastener.

Movement of the Belt Fastener.

When we come to consider the real motion of a point on the belt, say the belt fastener, the results are rather extraordinary. The method of plotting the curve is too long to be given in detail here, though the principles involved do not differ from those already used. The chain-dotted curve in fig. 3 gives the approximate form of the locus of the belt fastener for a single-geared machine having a gear ratio of 5. The straight portion *a b* represents the true path, relative to the road, of the fastener while it traverses the distance between the engine pulley and the belt rim. From *b* to *c* the fastener is actually passing round the belt rim, while the straight portion *c d* of the locus corresponds to the period during which the belt fastener passes from the belt rim to the pulley. The double curve *d e* is caused by the passage of the fastener round the engine pulley.

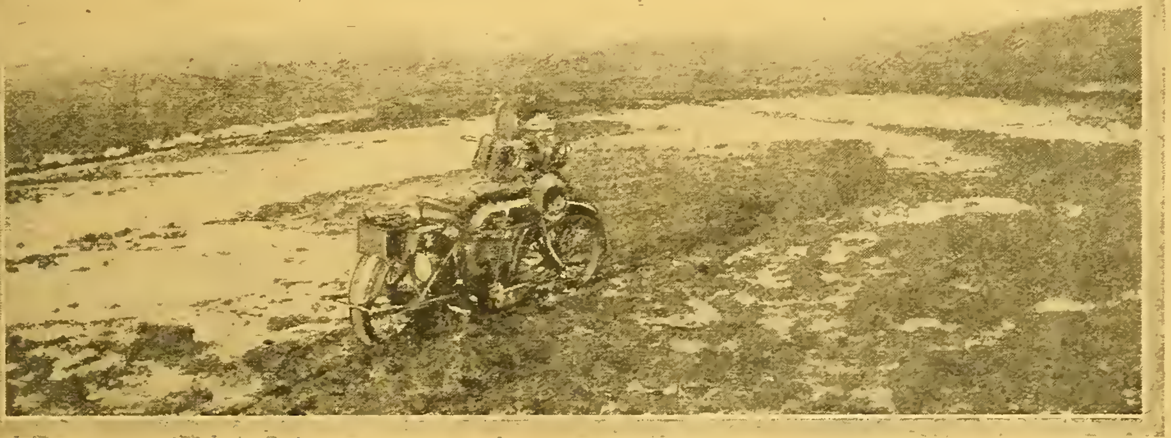
Periodicity.

The three curves in fig. 3 are all drawn to the same scale as the motor cycle which is represented as generating them. Since, in this case, the gear ratio is taken as 5, instead of 8, as in fig. 1, the full line curve traced by the gudgeon pin is somewhat flatter than the one drawn in fig. 1. In comparing the loci in fig. 3, it is interesting to note the variations in what may be termed the periodicity of the motions represented. The engine-shaft makes five revolutions for one turn of the road wheel, hence the piston curve exhibits five undulations for each complete cycloid generated by a point on the tread of the tyre. The "wave length" of the belt fastener path—that is, the distance from *a* to *e*—is the longest of all.

Variations of Speed.

As for the actual linear speeds of the selected points along their respective paths, it may be said that the piston pin attains its maximum speed at about the point C_1, fig. 1. The value of this speed will be in the region of one and one-third times the forward speed of the motor cycle, the precise figure depending upon the gear ratio. When the piston is at the top or bottom of its stroke the speed is, of course, identical with that of the whole machine. A point on the tread of the tyre undergoes very violent fluctuations of speed. When in such positions as A and A_1, fig. 2, the point is absolutely at rest, whereas at position E its velocity is just double that of the motor cycle. The varying speed of the belt fastener can easily be seen by comparing the straight portion *a b* of the path with the part *d c* (fig. 3). The fastener takes the same time to traverse two distances, one of which is four times as great as the other.

MOHANDIS.

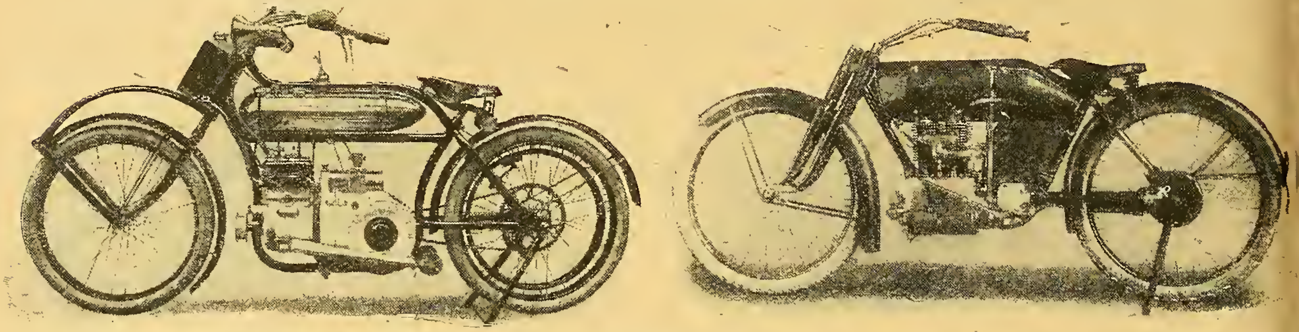


It would be hard to conceive a more desolate and sullen landscape than the one reproduced. The solitary riderless motor cycle sunk in the mud only adds to the melancholy of this Macedonian scene, and, incidentally, shows that the life of the D.R. in that country is not altogether a bed of roses.

THE SIDE-BY-SIDE TWIN ENGINE.

Some Observations on Engines in General and the "Vertical" Twin in Particular.

Excepting those that have the two-stroke type of engine, there are no motor cycles on the market to-day that are fitted with side-by-side two-cylinder engines. Yet this type of power plant offers certain advantages over other types more favoured by motor cycle engineers. As will be seen from this article, quite a number of "vertical" twin engines have been made, and undoubtedly brief particulars concerning them will be read with interest by those of our readers who have not followed the evolution of the motor cycle to its present stage, while to the younger generation it may come as a surprise that such engines have been designed, built, and forgotten.



(Left) The 1913 Morse-Beauregard, an American vertical twin with integral gear box and shaft drive. (Right) The Herdtlé-Bruneau, a French production.

WHY has the "vertical" two-cylinder apparently received such scant attention on the part of motor cycle designers?

This is a question often asked by present-day motor cyclists when discussing motor cycle engines, while to light car owners, who have owned small cars fitted with this type of engine, the question is a greater mystery.

Unfortunately, the "vertical" twin has not been sufficiently developed to allow a motor cyclist to judge its merits in comparison with the V and flat twins and singles. Even in the vertical twin two-stroke type there is only the Scott which is known to a number of riders. The engine of this machine has side-by-side cylinders, and is placed in the frame in an inclined position, therefore is not, strictly speaking, a "vertical" twin. However, for the purposes of this article, it is sufficient to class both inclined and vertical engines together as the side-by-side type. The Allon and the Premier twin two-strokes were introduced only just prior to the war, and their *début* as marketed machines has been postponed.

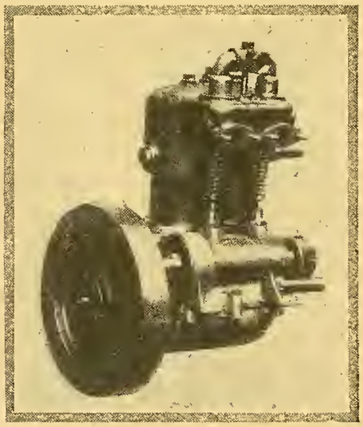
However, every rider of a Scott will confirm that, on the point of balance, this vertical twin offers very decided advantages over the V twin.

I have had considerable experience with all types of engine in every kind of vehicle, but the only branch of motoring in which I can find all types of engine likely to be fitted to motor cycles is that of the light car. Obviously it is desirable to compare engines working under similar conditions rather than to attempt to draw conclusions from experience with, say, a six-cylinder Rolls-Royce on the one hand and a lightweight motor cycle on the other. Hence, my mind travels back to experiences with light cars, and I have no hesitation in placing the various engines in the following order:

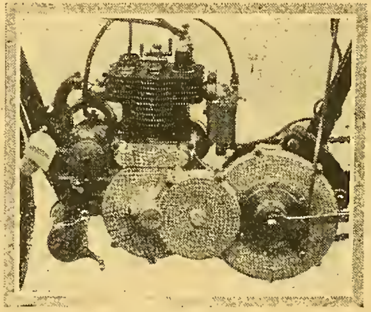
1. Six-cylinder vertical.
2. Four-cylinder vertical.
3. Two-cylinder flat, 180° cranks.
4. Two-cylinder vertical, 180° cranks.
5. Two-cylinder 90° V, single throw cranks.
6. Two-cylinder 90° V, 90° cranks.
7. Two-cylinder V 60°, single throw cranks.
8. Two cylinder vertical, single throw cranks.
9. One-cylinder.

The six-cylinder vertical engine can be ruled out as a type outside the present scope of the motor cycle. The four-cylinder engine, I am convinced, will eventually be regarded with favour in this country, but for the time being anything over two cylinders apparently does not interest the motor cycle designer.

In the two-cylinder group we have six different types, among which the flat twin certainly leads. With this type of engine we have excellent balance, combined with even firing. The 90° V engine comes next, because it is possible to balance an engine of this type perfectly in every way; indeed, in this



An early A.J.S. side-by-side engine, which was fitted in the Stevens tricar in 1904.



The French-made Alcyon of 1911. Note the countershaft gear. The final chain drive was geared up.

The Rudge experiment with two 3½ h.p. single-cylinder engines placed side by side.

CONTINUED SUCCESSES OF

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150 MILES RELIABILITY TRIAL:

		POINTS
B.S.A.	(H Bristow)	**100%**
B.S.A.	(D. Y. Rennie)	**100%**
B.S.A.	(E. Tyler)	**100%**

B.S.A. Machines were the only competitors to score the full number of points.

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the World will seem a different place and Life a new sensation!

Then will long drawn-out suspense give way to pride and pleasure — then as we snatch the golden hours and spin o'er hill and dale, by river side or within sight and sound of the silver sea — we shall just LIVE again! —

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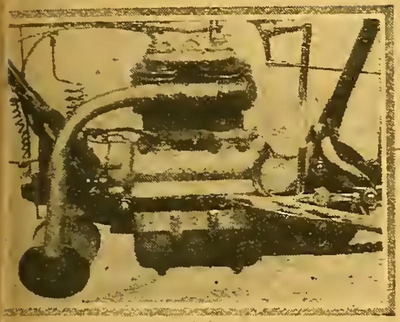


The Rochet motor cycle, with neat engine-gear unit and chain drive—a 1905 production.

spect it is superior even to a four-linder vertical engine.

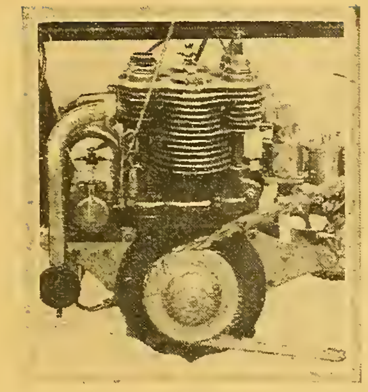
It will be noted that in scheduling y impressions of engines in light cars he two-cylinder vertical type with 180° ranks is placed before the 90° twin. his is due to the fact that there have een more suitable engines of the former ype for light cars than those of the tter—at least, that has been my xperience.

In the vertical two-cylinder engine ith a single crank pin the balance is o better than in a single-cylinder engine, nd the designers have obtained even ring at the expense of good balance.

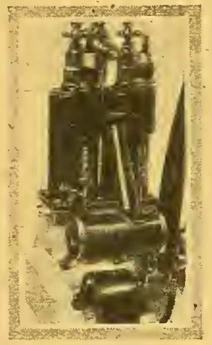
Balance and Firing Torque.

When an engine is running at a speed f 1,000 r.p.m. and over, the question of iring torque becomes insignificant when ompared with that of balance; indeed, ne notices very little difference in this espect among all the two-cylinder types xcept when they are running slowly.

The two-cylinder vertical engine with 180° cranks is certainly superior on many points to the conventional 60° twin, and since the flat twin and the 90° engine are not favoured by certain designers one cannot understand why the 60° twin is chosen instead of the vertical type which is superior to it. This may have been due to the gradual development of the motor cycle from the original motor-assisted cycle. The transmission was an easy matter while it was only necessary to connect up the engine with the rear wheel by means of a belt; consequently, the crank case dimensions of the single-cylinder engine were retained when a two-cylinder engine was introduced. The evolution of the motor cycle has been largely governed by the manufacturers' tendencies to follow the line of least resistance. One can quite understand this when it is considered that for many years the development of the engine alone was a problem quite big enough without the designers introducing what they may have considered side issues such as new transmission systems. Maybe, this method of development of separate units has not been so successful as one would have been in which the complete motor cycle had been taken as a whole. In the car world the latter was the case, with the result that, although the motor car evolved from the horse-drawn carriage, there is not a single point in a modern motor car following the practices of the parent vehicle. The same cannot be said of the motor cycle. It commenced as a motor-assisted bicycle, and bicycle practice is still in evidence at many points.

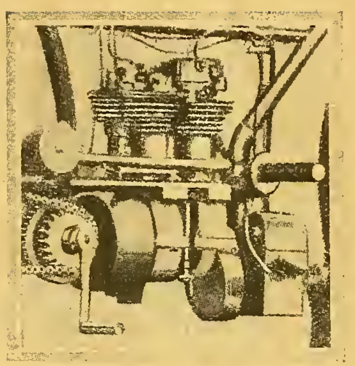


The Bercley of 1905—a side-by-side twin placed across the centre line of the frame.



A 1908 L.M.C. engine.

We think that had designers considered the machine as a whole there would have been more vertical twin engines, and probably four-cylinder engines also; but, in this case, it is only of recent years that the small capacity cylinder has been made nearly as efficient proportionately as the larger engine.



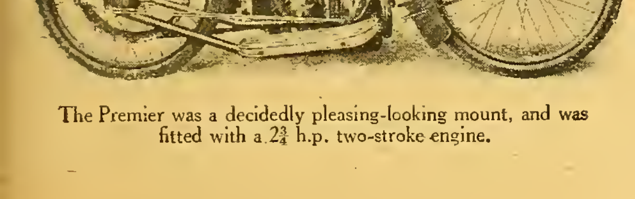
The Moto-Rêve vertical twin built in 1909.

It may be recalled that when the little four-cylinder Singer light car was introduced to the motoring world by *The Motor Cycle* it was ridiculed. Its small cylinders were likened to bicycle pumps, and very few thought that such an engine would prove to be more effective for its purpose than a two-cylinder with cylinders of double the capacity.

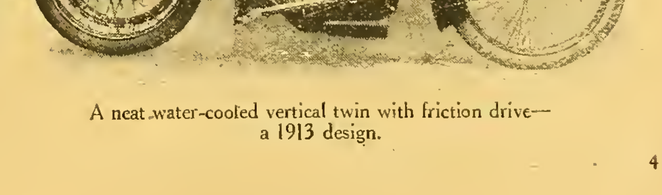
Vertical Twin Experiments.

The vertical two-cylinder engine with 180° cranks has several points to recommend it. It is excellently balanced, it is compact—a most important point where motor cycles are concerned—and it can be made more accessible than any other type of engine, excepting the single. Its only drawback is its very irregular firing torque, two explosions taking place during one revolution and one in the next.

Quite a number of motor cycle concerns known to present-day riders have experimented with vertical twins in various forms. The Scott Co., Alldays and Onions, and the Premier Co. introduced side-by-side two-stroke engines, while the Rudge, Singer, Centaur, Quadrant, L.M.C., Triumph, and A. J. Stevens concerns have made twin vertical four strokes. The Rudge engine was just an adaptation of two $3\frac{1}{2}$ h.p. single-cylinder units placed side by side in a motor cycle frame. The Singer effort was a similar combination adapted for an experimental belt-driven cycle car. The Quadrant, too, was only an adaptation; but the

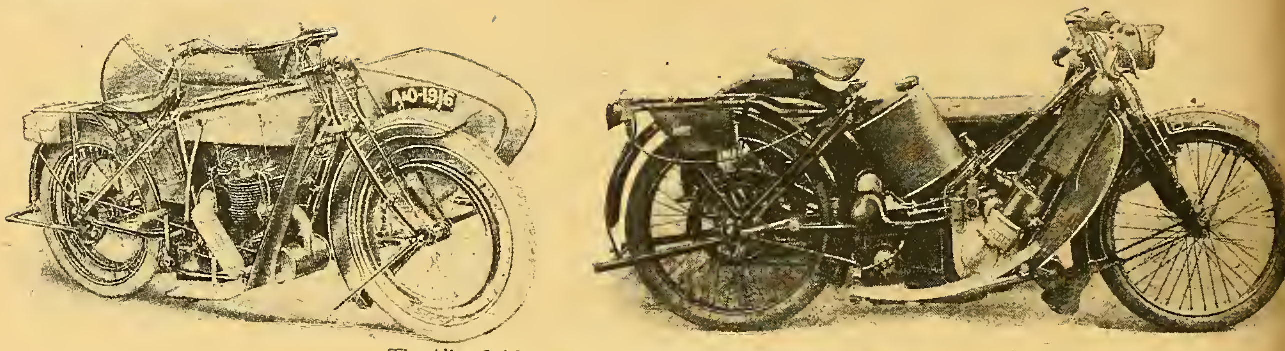


The Premier was a decidedly pleasing-looking mount, and was fitted with a $2\frac{3}{4}$ h.p. two-stroke engine.



A neat water-cooled vertical twin with friction drive—a 1913 design.

The Side-by-side Twin Engine.—



The Allon 5-6 h.p. and 3¾ h.p. Scott two-stroke sidecar outfits.

Centaur, L.M.C., and Triumph were serious attempts to produce a vertical twin engine for motor bicycle work, while **the A. J.** Stevens engine was used for tricars.

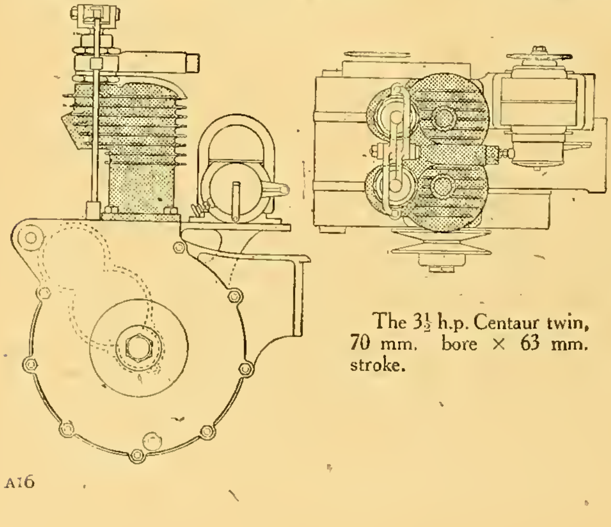
As far back as 1903 a French racing machine was fitted with a 14 h.p. vertical twin air-cooled engine. In 1904 the Stevens engine was introduced, and also the Werner 4 h.p. engine with cylinders 60×76 mm.

Various Twin Designs.

In 1905 there were the Bercley 5 h.p. 70×80 mm. engine and the French-made Rochet motor cycle. The Bercley engine appears to have been favourably received by several motor cycle manufacturers, for in 1906 and 1907 the Royal Consort and the Onaway machines were fitted with it.

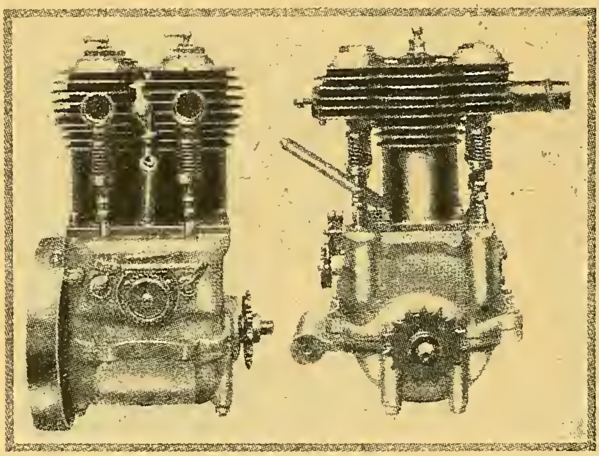
In 1908 the L.M.C. was introduced, followed by the Moto-Rêve in 1909, and the Alcyon in 1911.

During 1910 the Centaur Co. experimented with a small vertical twin-engined motor cycle, which was a very nice little machine in many ways. The air-cooled cylinders were cast *en bloc*, and had mechanically operated overhead inlet valves. The bore and stroke were 70×63 mm. respectively, and the engine occupied space in the frame approximating to that of a conventional 3½ h.p. single-cylinder engine.



The 3½ h.p. Centaur twin, 70 mm. bore × 63 mm. stroke.

In 1912 Mr. B. H. Davies—who is well known to readers of *The Motor Cycle*—suggested a specification for an ideal motor cycle which included a vertical twin engine, and 1913 saw a Triumph engine on the road in an experimental form, but it never reached the marketing stage.



The Triumph vertical twin which, at the time it was described (1913), created great interest.

The Triumph engine was a most interesting design, embodying a worm-driven camshaft across the crank case between the 180° cranks, which carried cams at each end. The cylinders had "T" combustion heads — an unusual practice even in the car world, the engine of the Baby Peugeot small light car being one of the few which embodies it. In small cylinders, however, the "T" head offers the advantage that comparatively large valves can be used, and for this reason it was favoured by motor cycle engineers, who in multi-cylinder engines are called upon to work with smaller dimensions than their brethren in the large car field. The Triumph, probably, is the most interesting motor cycle engine of the side-by-side four-stroke type which has been made, and, as is apparent from examination of the pictures illustrating it, it was a most carefully thought-out design. I understand that this machine is still on the road, although the makers, in their very sound policy of concentration, appear to have abandoned their experiments.

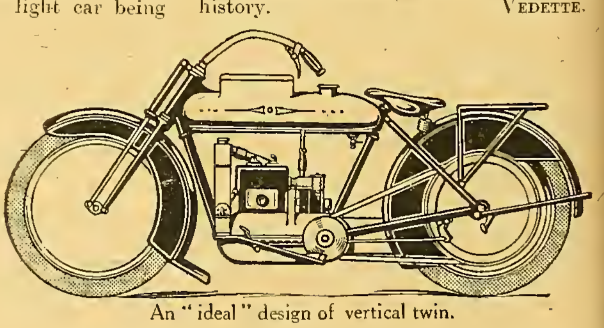
The American M-B machine appeared about this time, and also another French production—the Herdtlé-Bruneau.

Suitable for Shaft-drive.

Of late years, however, no effort appears to have been made to develop this type of engine, excepting in the two-stroke class, but should shaft transmission become popular the vertical twin will be more suitable than either the flat or V types.

Much depends also on the development of the two-stroke cycle, as an engine of this type with side-by-side cylinders and 180° cranks is equal to a four-cylinder on points of balance (the couple excepted) and firing torque. If the two-stroke is eventually made equal in overall efficiency to the four-stroke, the side-by-side engine certainly is a type of the future. But even if no more are made, this article renders service to motor cycle history.

VEDETTE.

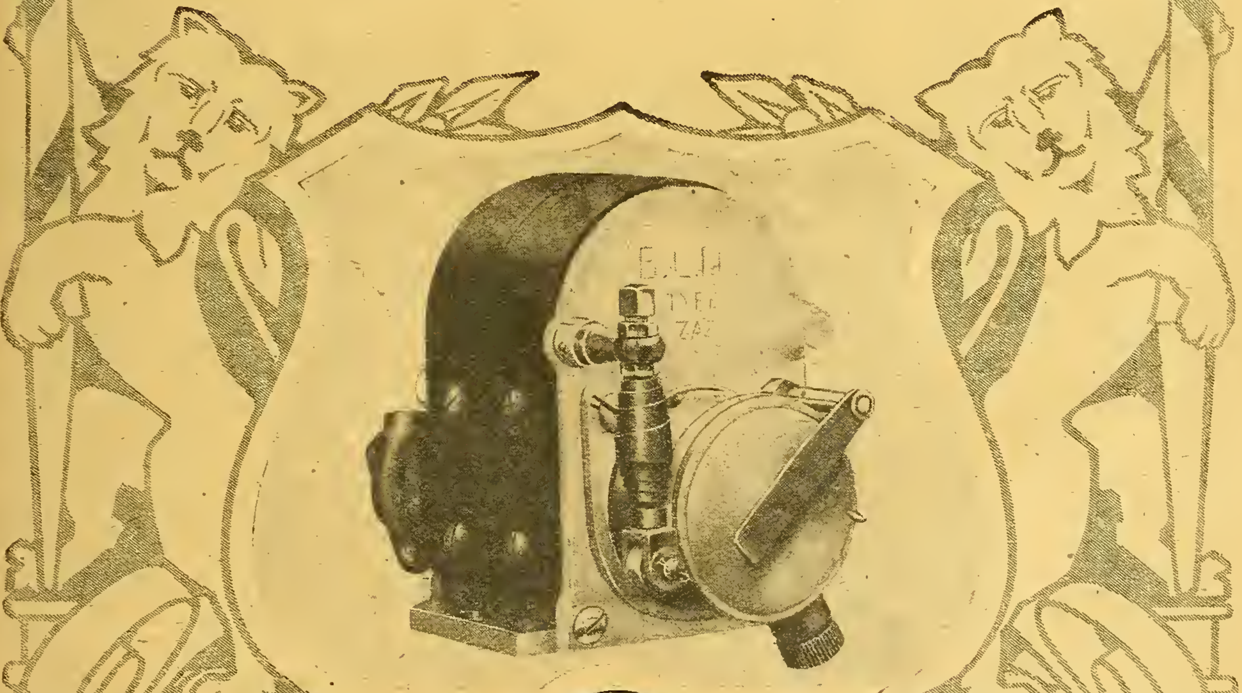


An "ideal" design of vertical twin.

B·L·I·C

The British-built Magneto with a record behind it.

RENOWNED for Reliability and Efficiency, its performances under war conditions have served to perfect the sterling qualities of the "B.L.I.C." MAGNETO, and to-day it stands supreme amongst magnetos—whether British or foreign.



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BRITISH MOTOR AND ALLIED MANUFACTURERS ASSOCIATION

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J·A·P

Since its introduction in 1895, we have been continually improving our manufacturing resources, and are now in possession of a factory, the efficiency of which is unequalled.

The large number of J.A.P. Engines at present in use on heavy War Service, in a multitude of ways working satisfactorily under abnormal strain, is testimony of their power and efficiency.

Full range—2½, 4, 5, 6, 8, 10 h.p. and 11.9 h.p. four-cylinder engines.

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CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

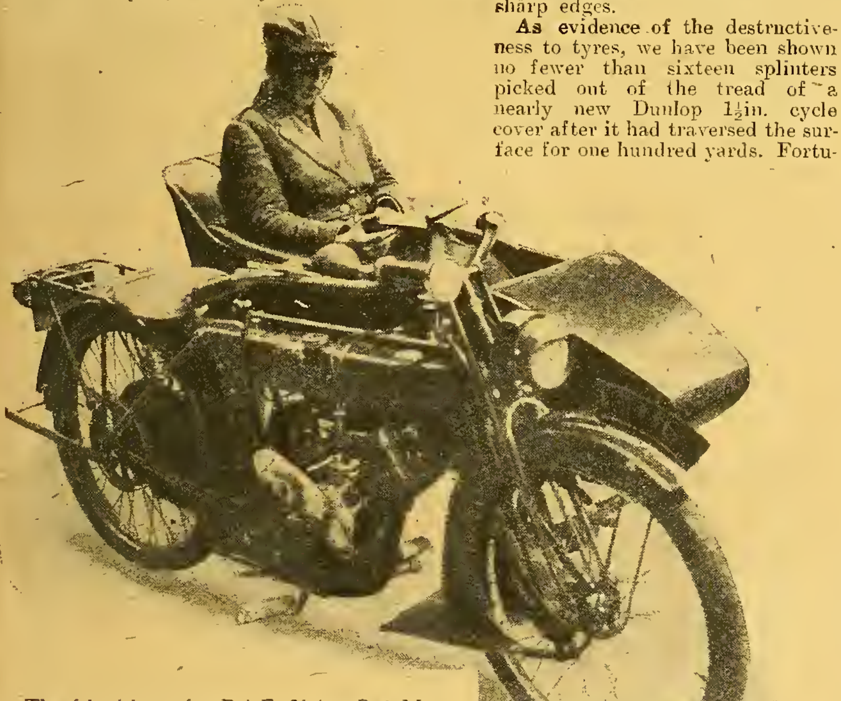
June	6th	9.40 p.m.
,,	8th	9.42 ,,
,,	10th	9.43 ,,
,,	12th	9.44 ,,

The Motor Volunteers.

Several of the local volunteer forces are in need of motor transport, and any offers will be eagerly accepted. Petrol is provided free, and a most enjoyable day's outing is the usual result.

Ministry of Reconstruction.

The Motor Industries Branch Committee of the Engineering Trades (New Industries) Committee of the Ministry of Reconstruction is now as follows: Chairman, Mr. H. C. B. Underdown (Commercial Cars and Sheffield-Simplex); vice-chairman, Mr. B. Caillard (Wolseley); Messrs. E. Powell (Humber), J. W. Stocks (Components), L. Walton (Vauxhall), E. M. C. Instone (Daimler), G. M. Young (Albion), C. A. Hyde (B.S.A.), and H. M. Wyatt, secretary.



The fair driver of a R.A.F 3½ h.p. P. & M. sidecar combination. She belongs to the Women's Legion, is attached to the R.A.F., and is known as a Penguin, because, though she wears the wings of the Royal Air Force she will never fly. Her officer is engaged in business at his place of call, while she whiles away the time in the sidecar with a novel.

Association of British Motor and Allied Manufacturers, Ltd.

This association is now going strongly, and a number of special committees are in being. These include two engaged on work that has been the subject of frequent comment in recent issues of *The Motor Cycle*, viz., overseas trade and research.

Special Features.

SIDE-BY-SIDE TWIN ENGINE.

THE RALEIGH ON THE ROAD.

AN ELECTRIC MOTOR CYCLE.

Municipal Road Repairing Methods.

We have before us a specimen of road material, which appears to be broken furnace slag. It has been freely scattered on suburban Birmingham roads during the past week-end, presumably by the municipal authorities, but for what purpose is not apparent.

The road mentioned to us is one of dry, bone-hard, tarred surface shaded by trees, so that there can be no question of absorbing a sticky or newly tarred surface. Furnace slag breaks up into something very nearly akin to broken glass. The pieces were picked up haphazard, and vary from ¼in. knife-like splinters to 2½in. lumps, each a mass of large points and sharp edges.

As evidence of the destructiveness to tyres, we have been shown no fewer than sixteen splinters picked out of the tread of a nearly new Dunlop 1½in. cycle cover after it had traversed the surface for one hundred yards. Fortunately, only one has penetrated enough to cause a slow puncture.

These points stand out: (1) The absurd type of material, (2) needless waste of labour in these days, and (3) the total disregard for the convenience of cyclists and motorists, to say nothing of pedestrians.

Some Sparks.

It is said—we cannot hold ourselves responsible for the truth of the rumour—that there is in existence a magneto capable of giving 45,000 sparks per minute. Can any reader confirm?

A Presentation.

At a gathering which followed the annual general meeting of the British Ignition Apparatus Association last week, Mr. Ernest Garton, who has acted as hon. secretary of the association from its inception, was entertained at dinner by the members, and presented on their behalf by the chairman, Mr. Peter F. Bennett, with a token of appreciation and thanks in the form of a very handsome grandfather clock.

Officials of the A.B.M.A.M.

The following are the present chairmen and vice-chairmen of the various sections of this association: Section of Private Car Manufacturers—Chairman, Mr. E. Powell (Humber); vice-chairman, Mr. L. Walton (Vauxhall). Commercial Vehicle Section—Chairman, Mr. H. C. B. Underdown (Commercial Cars); vice-chairman, Mr. F. Churchill (J. and E. Hall). Motor Cycle Section—Chairman, Mr. J. W. Stocks (Components); vice-chairman, Mr. C. A. Hyde (B.S.A.). Accessories and Components Section—Chairman, Mr. Bernard Caillard (British Lighting and Ignition Co.); vice-chairman, Mr. H. Johnson (Lucas).

Petrol Consumption.

In a recent petrol consumption trial at Hamilton, Ontario, the rider of a Henderson used only three and a quarter quarts of petrol for a journey of ninety-eight miles. This is equivalent to the rate of 121 m.p.g. The rider was a private owner and did not use any extra fittings on his machine.

Another owner rode a Harley-Davidson, and used five and a quarter quarts for the same distance. Another Henderson, to which was attached a sidecar, covered the ninety-eight miles on six quarts.

Formation of a New Club in South Africa.

A new motor cycle club has been recently formed at Jansenville (South Africa).

Patents.

How many of our readers interested in patents are aware that a German can—or could until recently—ensure protection for his invention in England? Have any English patentees tried to obtain patents and secure royalties on their ideas to take effect in Germany in war-time?

A 400 Miles Trial in Natal.

A trial run from Durban to Ladysmith and back was recently held in Natal. Out of nineteen starters, only six finished, and out of the six five rode Harley-Davidsons. Doubtless, owing to the war, England was represented by only four machines, and all the other competitors rode either Indians or Harley-Davidsons. The winner was Spargo (Harley-Davidson sidecar).

Hill-climbing in America.

The trade organises the hill-climbs in U.S.A., and a freak hill usually is found which is very difficult to surmount. At a recent big event, the course was 500 feet, and no competitor succeeded in reaching the top, the prize going to the man who covered the greatest distance. The official announcement of the results mentions, besides the make of the machine, the names of the makers of the tyres, magneto, saddle, etc.

A Bomb for F.N.

According to *Les Nouvelles*, the British air raid on Liège caused a considerable amount of damage, and it is reported that a bomb was dropped upon the National Arsenal, which is now controlled by Germans. This is the famous Fabrique Nationale d'Armes de Guerre, our old friends the makers of the F.N., whose workpeople made such a gallant resistance when the Germans first entered Liège, and whose women employees poured boiling water on the Huns.

A.C.U. Messenger: Woolwich Police Summons.

At Woolwich Police Court on Friday, Albert Thorne, of Blackheath, was summoned for exceeding the speed limit at Eltham, for using an unregistered motor cycle, and improper use of petrol or substitute. P.C. Oldfield said the speed was 42 m.p.h. When asked if he was in the Army, defendant, who was in semi-military uniform, replied, "I am on Government service," and produced a petrol permit, saying he was employed for two days a week as a messenger between the G.P.O. and W.O., and was testing the motor cycle when stopped.

Fine and Costs for a Volunteer.

For the defence, it was stated that Thorne was a member of the Auto Cycle Union's Motor Messenger Detachment that provides the volunteer messengers for the W.O., and on two days a week the petrol was supplied him. On this occasion he was testing the motor cycle (that he purchased a week before) to see if fit for service. Fined 20s. for first offence, 10s. for second, and third dismissed with costs.

Four-inch Tyres.

A writer in a contemporary suggests 4in. tyres in lieu of spring frames. The early Pennington machines had small wheels with enormous tyres.

Petrol Engine as Air Compressor.

The quaintest use to which we remember seeing a motor cycle engine put is that evolved by a resourceful repairman in the South of London. Not so long ago we noticed a veteran 2 h.p. Minerva perched oddly among the overhead shafting. The proprietor (an ex-Navy artificer—perhaps that accounts for it!) had connected it up to the shaft pulley with a flat belt, filled the crank case with oil, and was using the unit to pump air through a long length of motor cycle tubing to a section of piping connected to the gas supply, and had thus secured, at the minimum of expense, a strong pressure for a blowpipe.

Keeping Horses.

More than one motorist has probably thought of avoiding petrol troubles by going in for "horseflesh," and the sight of horses used unrestrainedly for joy-riding may have annoyed some motorists, but owning a horse at the present time is not all "beer and skittles." If you cannot feed your motor it will not go, and there is an end of it; but in the case of a horse the matter is different, and many a horse owner has for long been at his wits' end as to where the next meal for his friend is coming from. It is not pleasant to think you are starving a hard-working beast to death, or giving him so little food, bought at a fabulous price, that he cannot be expected to work, and so is costing much money and giving nothing in return for it.

This is where the motor does score.

The United Arts Rifles.

During the Whitsun week-end a very pleasant and interesting day was spent in the country in field and road sketching operations by the Motor Squadron of the United Arts Rifles, for the instruction of members on how to read and draw a map. This kind of work will be carried out by the 1st Battalion (United Arts Rifles) County of London Volunteer Regt. during the summer months. The accompanying photograph of the left wing of the Motor Squadron shows part of a turn-out on a recent Sunday parade.

Fuel for the Summer!

It is surprising how hard some rumou die. We are still being asked if we ca say if there is truth in the rumour tha petrol—or at least a certain amount of i —is to be released for joy-riding thi summer. Unfortunately there is not.

Tyres.

So many pre-war machines have bee laid up that when motor cycling is agai permitted as a pastime there will be considerable demand for tyres to re-equi them. Will tyre manufacturers mak tyres suitable for the old type rims, a in 1914 the tyre and rim standards wer altered?

Air Cooling.

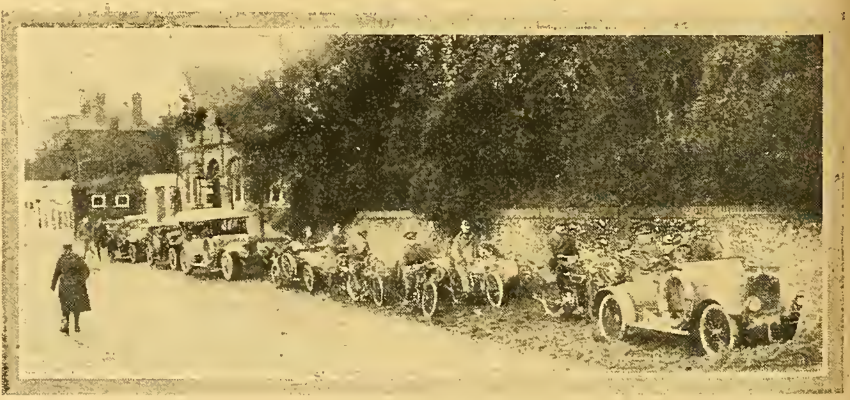
The Franklin system of air-cooling (drawing air down vertical fins on the cylinder by means of a fan on the flywheel) is being used on engines for a variety of purposes. Electric lighting plants and other auxiliary engines are a great deal less trouble to maintain when they have no water jackets, besides being more economical in fuel.

To Meet War Office Requirements.

One of the post-war J.A.P. engines (the 8 h.p.) was recently submitted to a very severe test by its makers, to meet War Office requirements. It was run continuously for seven days and nights with a load of 12 h.p. at 1,800 r.p.m. During the whole of the test the engine did not need the slightest attention, nor show any signs of loss of power. When the engine was dismantled after the test careful examination failed to show any trace of wear.

Repair Work.

Yielding to domestic pressure, and touched by the trust shown in our omniscience in matters mechanical, we took our player piano to bits the other day. These are interesting beasts to dissect: it is instructive to put on a Scherzo and see the revolutions they are capable of. It is marvellous how such a flimsy contrivance of wood and fibre bearings, tiny brass driving chains, canvas bellows, and skimpy controls stands up to its work. The thing is as much of a "running miracle" as Kipling's steam car in that motoring classic "Steam Tactics." (Do you remember the raceful of ball bearings "strewn four miles along a Hampshire road," and recovered in detail?)



The left wing of the motor squadron of the United Arts Rifles, County of London Volunteers.

THE MOTOR CYCLE

AVIATION SECTION

The enormous importance of the Air Service needs no emphasis; it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National Service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouragement of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

The New Role.

Three former motor cyclists now on he headquarters staff of the Air Ministry re Majors S. R. Axford, Reginald G. Holloway, and T. G. Baxendon.

Best Quality Petrol!

The best quality petrol is now reserved xclusively for flying purposes. Testing ero engines at manufacturers' works is argely carried out on coal gas.

Money.

How many airmen have any idea as to he cash value of the 'buses they "crash" and play with as toys? The crankshaft of the R.A.F. 4A engine costs something in the neighbourhood of £120! The cost of the average motor cycle crankshaft in pre-war days was about 25s., and that of the Ford car about £3.

The R.A.F. House Magazine.

Still the members of the Flying Service staff await the appearance of the long-promised House Magazine—a production approved by Lord Rothermere, the former Secretary of State. Subscriptions for the magazine were invited and obtained in hundreds some months ago. Why this delay?

An Old T.T. Rider.

In the Strand last week we caught a glimpse of Lt.-Col. H. Lister Cooper, R.A.F. Col. Cooper was a leading motor cyclist in pre-war days, and joined up soon after the outbreak of war, gaining his "wings" quite early in his Army career. He competed in the Tourist Trophy Races and several of the more important long-distance reliability trials, his usual mount being a Tourist Trophy Triumph. A year or two ago he gave Mr. Frank Hulbert, of the Triumph Cycle Co, his first experience of flying in an aeroplane.

AIRMEN MOTOR CYCLISTS

It is with great regret that we announce that Lt. Frank M. C. Houghton, R.A.F., was accidentally killed while flying on May 6th at a Wireless Experimental Establishment. He was twenty-three years of age, and was educated at Magdalen College School, Oxford, and Denstone College, Staffordshire. He left school on August 1st, 1914, and received his commission shortly afterwards in the Shropshire Light Infantry. He then transferred to the Army Cyclist Corps, and in May, 1916, became an observer in the R.A.F., in which force he served continuously for eighteen months in France, obtaining his wings in 1917.

We first made his acquaintance when, having offered his idea of a military motor cycle race meeting at Brooklands to a certain quarter, and receiving no encouragement, he approached us, and *The Motor Cycle* was able to help him considerably, and, with the assistance of the British Motor Cycle Racing Club, Houghton, on being appointed hon. secretary, was instrumental in organising one of the most successful and interesting meetings ever held on the famous track. This was followed by the United Services meeting in the following September.

The late Lt. F. M. C. Houghton, R.A.F.

It was obvious that the Army Cyclist Corps had few attractions for so keen a mechanical enthusiast as young Houghton, and it was only natural that he should transfer to the R.A.F. His favourite mount was a Rudge, on which he competed at the two meetings at Brooklands, and, despite the fact that he became an expert pilot, he always maintained that he found flying exceedingly dull, and much preferred to ride a motor bicycle. Not only was he a clever motor cycle rider, but he had the excellent gift of recording his experiences on paper in a particularly pleasing manner. He contributed several articles to *The Motor Cycle* in an easy, interesting style which was keenly appreciated by our readers, and one of his articles appeared in the issue of May 23rd, under a pseudonym which he had adopted for himself—"Pitot."

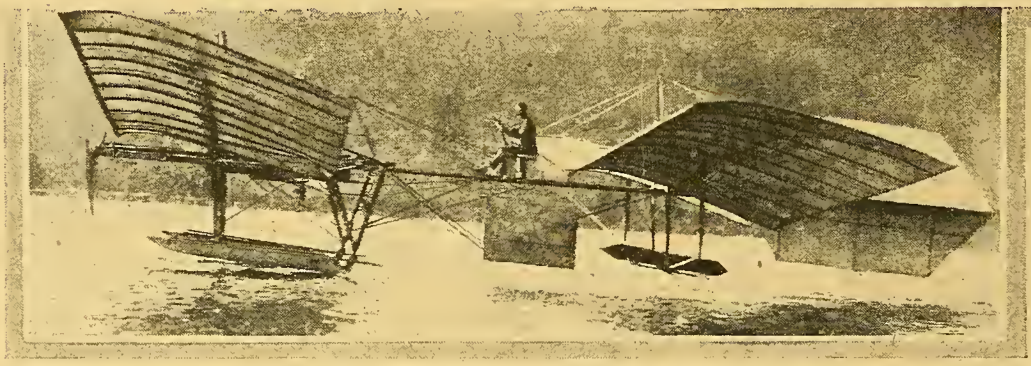
American Aircraft Production.

It is said that our American Ally is to form an Aircraft Production Department, and, as in England, it will be separated from the Army-proper.

Four-engined Bombers.

It is reported that the Germans have raided this country on more than one occasion with bombing Gothas having four engines. Those fetched down, according to published reports, were fitted with two engines.

TRIBULATIONS OF THE PIONEERS



The Langley tandem monoplane, constructed in America in 1902.

Adventures with a Monoplane that was engined with a Radial of 2½ lb. per h.p. in 1902.

"AT fifty miles an hour she nose-dived into the water, taking me under. I was all tied up in the framework, as my cork jacket was caught. I was able to tear loose, and except for swallowing a few pints more water than I calculated for, was none the worse for it!"

The speaker was Mr. Charles M. Manly, one of America's earliest experimenters in aviation, and now testing engineer to the Curtiss aeroplane firm in Buffalo. He had been chatting about the initial attempts at flight which he had made in America with the Langley tandem monoplane back in 1902. From 1896 Professor Langley and Mr. Manly had worked together on this ill-fated machine, in the face of apathy, and often open hostility. It was not until 1916 that their theories were triumphantly vindicated, and the original machine was taken from the Smithsonian Institute, overhauled, and without any alterations, made a perfectly successful flight.

In 1897 Professor Langley, who was connected with the Smithsonian Institute (a sort of combined British Museum and Kew Laboratory), decided to put into effect his long cherished theories about bird flight. His designs were so far approved that the authorities advanced him a sum of £10,000. Moreover, scale models had been made and successfully flown over a distance of threequarters of a mile.

2½ lb. per Horse-power.

The partners commenced work on a full-sized machine. The first difficulty that arose was the attainment of the necessary power within a reasonable weight. In those days engines were cumbrous in the extreme. The twain came to Europe, where they met with scant success. Count De Dion, Napier, and the Daimler Gesellschaft in Germany were all unanimous in saying that the thing was impossible. Discomfited, but undaunted, they returned. The travels of Odysseus and labours comparable to those of Hercules had ended in nothing.

It was here that the quality of the men showed itself. Mr. Manly went to work, and after a little less than a year he had produced an engine, an adaptation from rotary to radial form of another man's unsuccessful idea, which came out at 2½ lb. per h.p. One quarter of the weight originally hoped for, and a figure which even nowadays is reckoned fair.

An Anxious Moment.

Finally, the machine was ready for the trials. The launching was to be accomplished from the top of a cumbrous erection which had been run up on a barge, the pioneers having decided that water would be softer to fall upon. The machine was to be stored in pieces in the barge, and when one of these fine days came, such as Wilbur Wright used to wait for (watching the smoke of his cigarette, and refusing to tempt the Fates if it did not ascend vertically!), when there seemed a fighting chance of success, they would release the big machine down the inclined plane to the water, and see what befell.

Mr. Manly was determined to pilot his weird offspring (a very good idea of her can be gleaned from the photograph, the original is one of the very few in existence), and on a bright December morn the incline was greased, and the word given to "Let go!"

Think of that moment, that was to have crowned years of effort, toil, anxiety, rebuffs, and the cold apathy that is worst of all. If life never held another moment for them, in that one they had certainly *lived*.

The awkward machine began to slither down the slope, and hitched! The release mechanism had failed to work; and thus arrested, the ill-starred craft put her head down and dropped like a plummet, with the effects described in the introductory paragraph.

Nothing daunted, the partners set to work to make good the damage. By this time the money was running low, and at that very time the authorities, in a panic, decided not to sanction a further grant of £4,000 which had been proposed.

Tribulations of the Pioneers.—

The two decided that, at least, they would have one more try—after which they would have to take up something lucrative, and leave the realisation of their dream to others. They patched her and spliced her, and made her ship-shape, until one evening, a little more gusty than they would have chosen if conditions had admitted of further delay, they made the final attempt.

A Second Attempt.

Mr. Manly clambered up into the precarious seat and grasped the controls. The machine slipped downwards, gathering speed. . . .

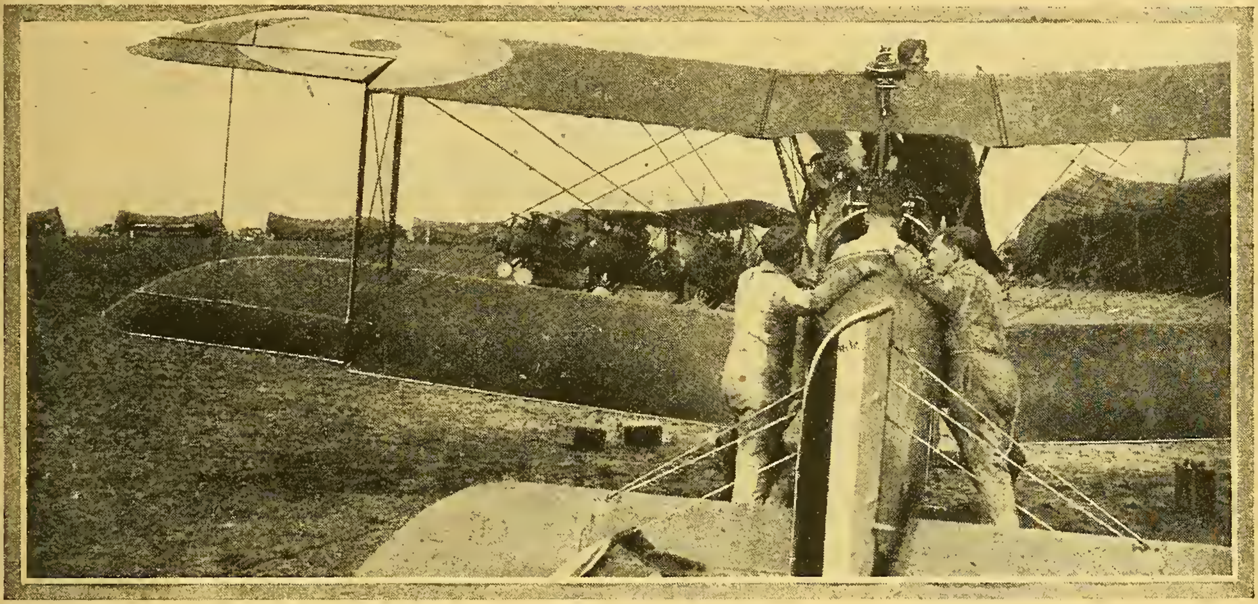
But the treacherous wind chose that moment to buffet the tail of the unwieldy craft, which snapped against the heavy guard rail of the incline. Utterly beyond control, but flying strongly, the machine rose, until it was twenty feet clear of the water, rising almost vertically.

For an instant it seemed that the machine would crash down on the barge, but instead it pivoted, the madly revolving propeller acting for the instant as a helicopter, and dropped, flat on its back in the water.

The saturated and indignant pilot crawled from under the wreck of his hopes, swearing to have nothing more to do with flying machines! (A rash resolution, for few men in America have a more intimate connection with aviation at present than he.)

The remnants were salved, and for years flippant sightseers made derogatory remarks about the machine in the museum where it was housed.

As has been told, fourteen years later it was exhumed, and flew faultlessly. R.H.B.



On the Western Front during the German offensive. An R.A.F. scout being tuned up for a "stunt."

* * *

THE PUZZLE OF THE SEAPLANE.

IT is a little difficult to understand why the seaplane has not died a natural death, and the answer is one of the bits of information which we all hope to receive when the war ends. So long as aeroplanes were grossly unreliable, it was obviously desirable to use machines which could "land" on the water, to commit rather a bull. But the punt-shaped floats of a seaplane, or the hull of a flying boat, add a lot to the weight of a machine, and vastly increase its "passive drag," or head resistance. One would have thought that land aeroplanes would supplant the seaplane and flying boat for overwater work, with the possible exception of districts where smooth waters are available, and where ground suitable for aerodromes is rare: *e.g.*, in the Italian lake district, and possibly round the great lakes of Africa. Yet a few days spent at any of our coastal resorts shows that the seaplane and flying-boat are still much in evidence, though their speed, climb, and carrying capacity are so inferior.

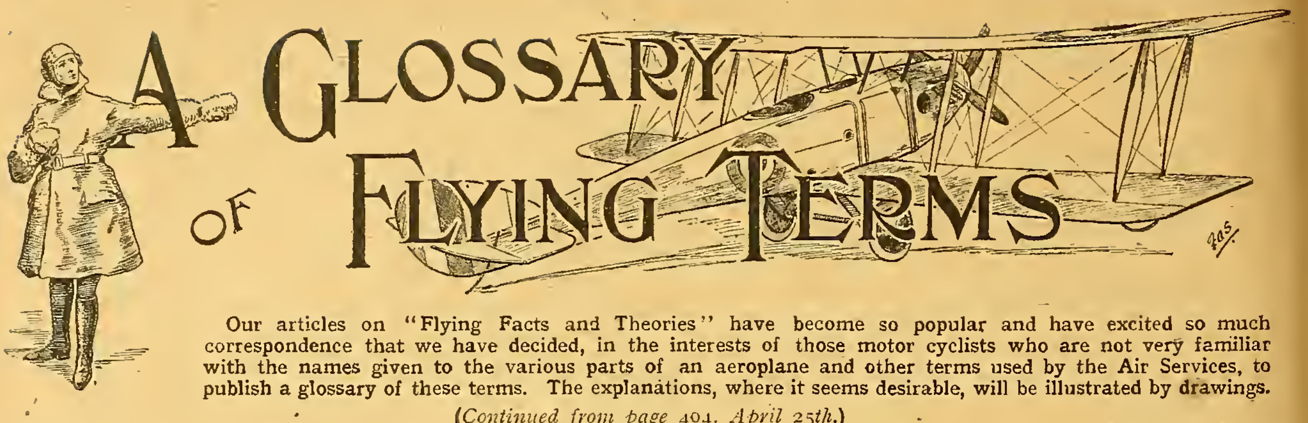
T.

CROSSING THE ATLANTIC.

A TRANSATLANTIC flight is already a technical possibility. Given average luck, any of the giant machines could manage it. Fritz's delay is quite explicable. The Italians, French, Americans, and our own men probably do not regard a mere sporting or technical record as worth while until sterner business is happily concluded. As the prevailing winds blow from the other side, the flight will probably be made in an easterly direction, and the "disthressful" island may witness the final triumphant landing. As the petrol tanks are emptied, they will probably be jettisoned into the sea, being mounted amidships so that their loss would not affect the centre of gravity: but it will hardly be possible to drop any engine which gives trouble, as its sacrifice would ruin the "trim" of the machine. Navigation problems will need careful working out, and if the "landfall" of the Irish coast is not made at the expected moment, the petrol tanks may be getting dangerously empty.

TORQUE.

A GLOSSARY OF FLYING TERMS



Our articles on "Flying Facts and Theories" have become so popular and have excited so much correspondence that we have decided, in the interests of those motor cyclists who are not very familiar with the names given to the various parts of an aeroplane and other terms used by the Air Services, to publish a glossary of these terms. The explanations, where it seems desirable, will be illustrated by drawings.

(*Continued from page 404, April 25th.*)

DOPE.

The fabric employed for covering aerofoils is usually the best Irish linen, which, if used in a natural state, would be imperfect in three leading respects. It could not be made sufficiently taut on the ribs by any mechanical method of stretching. It is by no means weatherproof, and would disintegrate rapidly. It is not airtight, but rather porous under the heavy air pressures involved in flying. As no more suitable fabric has yet been invented, it is necessary to coat the fabric. At one time fabrics were rubberised. Nowadays they are treated with several coats of "dope," followed by further coats of varnish. The dopes and varnishes vary both in the method of application and in their internal composition; but the aims of every coating formula may be summarised as follows: They are intended to contract in drying and make taut the fabric; to dry quickly, and so accelerate manufacture and repair; to be absolutely waterproof; to resist frost, vibration, and sun. Sunproofness includes resistance to heat, and also the use of a pigment to nullify the chemical action of certain light rays. The coating must be flexible, impervious to petrol and oil, and non-inflammable. Certain dopes are dangerous to the health of the "doper," and others—usually less efficient—are not.

DIHEDRAL ANGLES.

A dihedral angle normally means the angle between two planes. In aeronautics two such angles are familiar, which are known as the lateral and longitudinal dihedrals respectively.

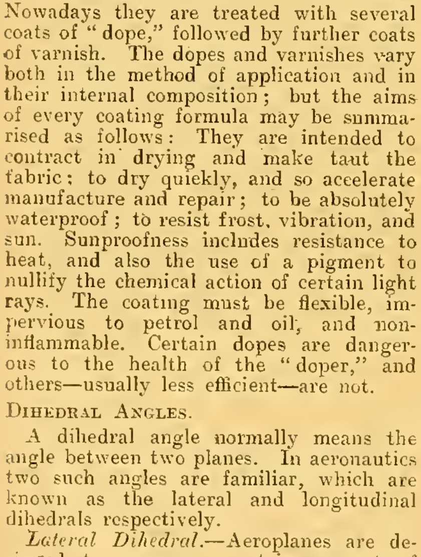


Fig. 1.

Lateral Dihedral.—Aeroplanes are designed to possess a certain amount of "stability," or natural balance. It would be intolerable for the pilot if every tiny gust of wind, every variation in the density of the air or the nature of its invisible currents, and every movement on the part of himself and his passengers, had to be corrected by a movement of one or other of the controls. Consequently, every machine is given a greater or less power of balancing itself against forces which tend to make it—

1. Roll from side to side (lateral instability).
2. Pitch from end to end (longitudinal instability).
3. Yaw to right and left of its course (directional instability).

The lateral dihedral is a device for conferring or improving lateral stability, and it consists of inclining the main planes upwards from the centre towards their wing tips, as shown in fig. 1 (left), which is a silhouette of a monoplane flying straight towards the reader. Dotted lines dropped from the ends of each plane to a ground line show that the horizontal equivalents (A B and B C) of both planes are equal. Other things being equal, the lift afforded by a wing is proportionate to its H.E. (horizontal equivalent). In fig. 1 (right) the same monoplane is shown tilted over to one side by any imaginary cause. Notice that the H.E. of the lower wing (A B) is now much greater than that of the upper wing (B C). The lower wing therefore exerts correspondingly more lift for the moment, and tends to throw the machine back on an even keel. If the wings were mounted in the same straight line with no dihedral the H.E. of both wings would be equally affected by a tilt, and no righting effect would be produced.

The weakness of the lateral dihedral lies in the fact that it has both to resist the sideway tilt and also to fling the machine back on to a level keel. It can only do this if the dihedral is sufficiently sharp to make a very appreciable difference in the horizontal equivalents of the two wings during a tilt. If this is done the H.E. is permanently reduced, and lift is sacrificed. Consequently, few designers employ less than a 170° dihedral, which is barely perceptible to the naked eye in a plane of fair span, and in flight exerts but a small righting influence.

Longitudinal Dihedral.—This tends to improve longitudinal stability, *i.e.*, it is a corrective of fore and aft pitching. This angle is shown in fig. 2, and exists not between two adjacent planes, but between two imaginary lines, illustrating the relation between the main plane and the tail plane. These lines are the "chords" or (more accurately) "neutral lift lines" produced till they meet. In fig. 2 the tail plane is obviously mounted at a different angle (of incidence) from the main plane. Otherwise, in geometry, their chords could never meet, but would be parallel. Actually, the effect of a longitudinal dihedral is produced in flight even when the main and tail planes are mounted at the same angle of incidence, because the main plane deflects the air downwards, and the tail plane therefore has a different angle *in relation to the air*, though it is fixed at the same angle in relation to the fuselage.

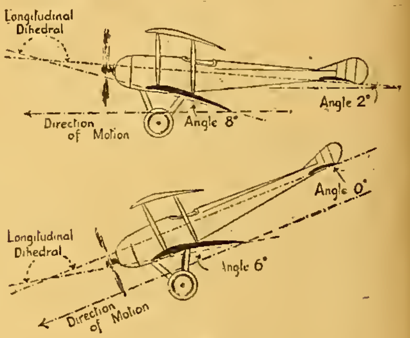
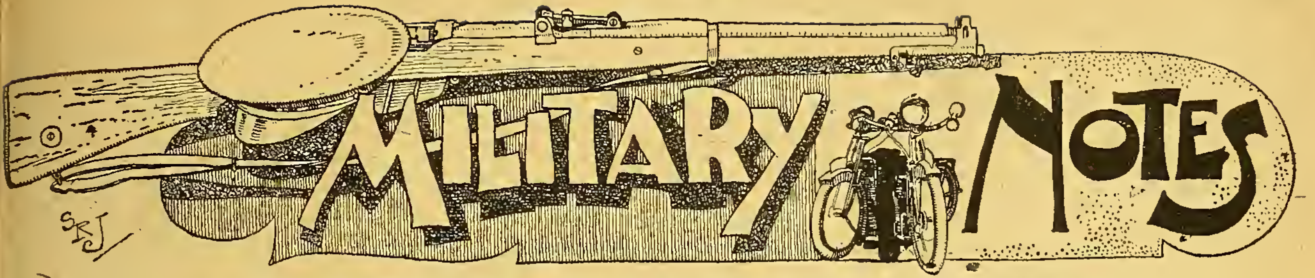


Fig. 2.

Fig. 2 illustrates how the longitudinal dihedral works. The main plane is given by the designer a normal angle of incidence of 8°, and the tail plane one of 2°. In the upper sketch the machine is flying horizontally, and the planes retain their normal angles. In the lower sketch the nose of the machine has bumped downwards, owing to atmospheric conditions. But it is no longer flying along a line dictated purely by its own thrust. A combination of forces, including the engine, gravity, and the air pressures, generated by its planes, is trying to make it fly downwards. On the other hand, the impetus gained in its level flight prior to the bump is trying to drive it horizontally. Its new direction is a compromise between the old impetus and the changed direction of the thrust due to the bump. It is, to commit a bull, flying at an "unnatural" angle, and this "unnatural" angle has reduced the angles of incidence in the case of both the main and tail planes. Suppose that each of them has lost 2°. The angle of the main plane is now 8°—2°, *i.e.*, it has lost a quarter: the tail plane is now 2°—2° *i.e.*, it has lost all. In other words, the tail plane has lost more of its lift than the main plane, since at these low angles the less the angle the less the lift. Down flops the tail, and the machine reassumes a level fore-and-aft position, though at a lower altitude than when the bump occurred.

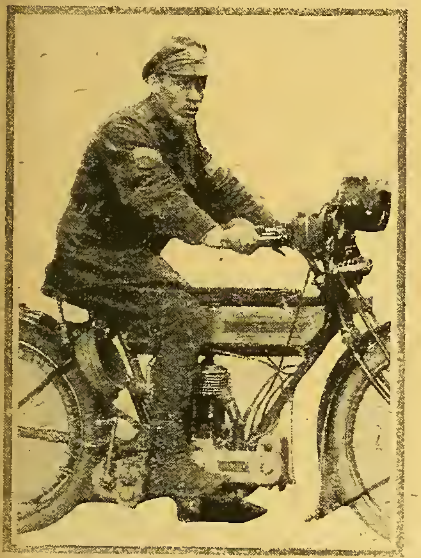
If a bump jerks the nose of the machine up, the converse action takes place.



A Famous Tennis Player. A Fine Record. Post-war Trials.

A FINE RECORD.

CPL. C. T. EVANS, M.M., Motor Cycle Despatch Rider, R.E., has been awarded a Bar to his Military Medal, after a splendid record of service. He enlisted the first week in August, 1914, went to France early in September, 1914, and has been there ever since. He was mentioned in despatches for gallantry in June, 1916, was awarded the M.M. for bravery in the field in September, 1916, and the Bar to his M.M. in May, 1918. He also holds the 1914 Star. When over on leave in November last he was called to Warwick, and was there presented with the M.M. by Brig.-Gen. Grove.



Cpl. C. T. Evans, M.M.

Previous to the war he was employed at the Rover Motor Co. (fitting department), Coventry.

* * *

HOW A. F. WILDING MET HIS DEATH.

AT the time we recorded the death of Capt. A. F. Wilding, R.N.D., the enthusiastic motor cyclist and champion lawn tennis player, who was killed in France three years ago, the way in which he met his death was not known to us. We now read in a contemporary, *The Auto*, that, while carrying despatches along a road which was being heavily shelled, Wilding passed a shelter, and, yielding to the persuasion of comrades who had already taken cover, he entered the refuge. A few seconds later a shell landed on the top of the shelter killing instantly all the inmates. The story is vouched for by Major R. S. Prentice, Overseas representative of the United States National Lawn Tennis Association.

* * *

KILLED WHILST FLYING.

IT is with regret that we learn that Sec.-Lt. Lewis Mogridge has been killed whilst flying.

He was a well-known competition rider prior to the war, having ridden V.S., Mead-Precision, and Rudge machines. He was a member of all the Liverpool Clubs, also of the Westmorland and one or two London Clubs. He was known as a competitor in the London-Edinburgh, Birmingham to Land's End, and other long-distance competitions.

At the outbreak of war he offered his services as a competent motor cyclist to the Inspecting Officer of the Motor Cycle Reserve Committee, West Lancs, Divl. Area, together with the late Lt. Felix Baxter, V.C.

For some little time after they applied there was no vacancy. Eventually they both obtained commissions, both being attached to the 8th Liverpool (Irish). Poor Baxter was killed. Lt. Mogridge served in France, and was invalided home with trench fever. During his convalescence at home he made application for transference to the Royal Air Force. This was granted, and he was accepted and trained, and eventually went Overseas, where he was killed whilst just starting a flight.

FRENCH AIR ACHIEVEMENTS.

FIFTEEN French airmen have brought down between them a total of 289 enemy machines. This number extends back over a considerable time, but Fonck, who is responsible for forty-five, brought down several quite recently.

* * *

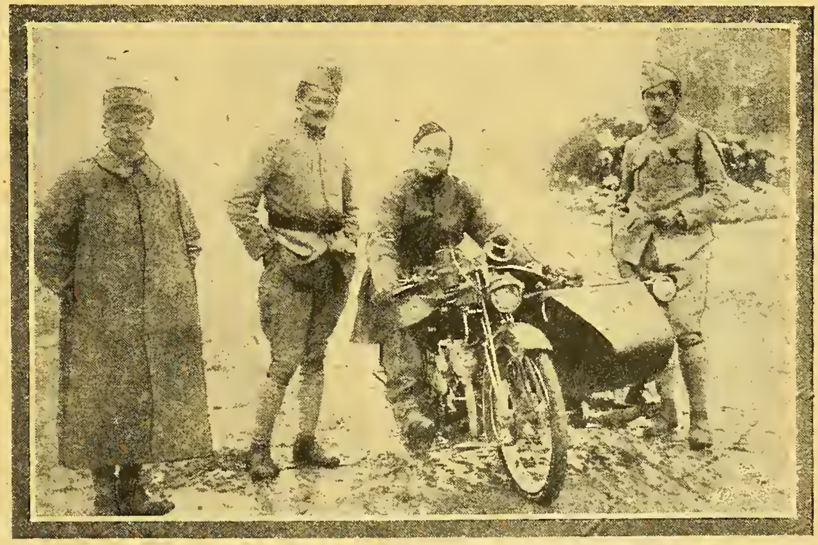
TRIALS AFTER THE WAR.

CPL. C. E. GREEN, R.E., and Cpl. J. Rhodes, R.E., both send chatty letters from France, and, curiously enough, touch upon the same topic—competitions after the war. Green hopes for the old days again, hill-climbs, and long-distance trials. Rhodes, however, says, "If we never have hill-climbs again very little will be lost. They were only of slight value to the trade, and not much use in eliminating the weaknesses of motor cycles." The question is a debatable one.

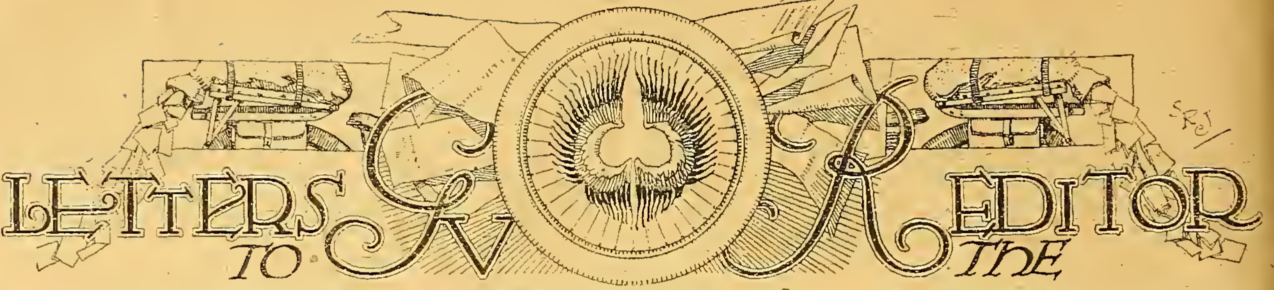
* * *

WITH THE TANKS.

IN a letter written from France, Pte. McDonald says that he has had an extremely rough time during the campaign. He joined the Tank Corps in 1916, and his first experience in "going over" was in June, 1917. He writes also of the later attacks in February, 1918. He drove an M.T. vehicle from the retreat of Antwerp in the first days of October, 1914, and was also in the forward area for two years. He was an enthusiastic motor cyclist.



Air-Mechanic T. P. Dixon, R.F.C., on his P. and M. and sidecar somewhere in the mountainous parts of France.



LETTERS TO THE EDITOR

The Ed tor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—*Re* the letter of "A Few M.T. Fitters" in *The Motor Cycle* of May 2nd, it is pleasing to note the "Few" in their *nom de plume*, as that must exactly describe them. To say that motor cyclist and car drivers (car drivers are technical, by the way) are under no circumstances allowed to do any repairs or adjustments is absolutely misleading, and not a truthful statement. My chum and I have been out here two years, and have done all repairs and adjustments, as a fitter is not included on our strength.

How do the "Few" account for road repairs which, in the balloons, are many, and I might add that our greatest terror is the overhauled remount, which we always have to put in order; but then perhaps one of the "Few" has had the matter in hand.

Trusting you will find space in your always welcome paper,

B.E.F. BALLOONS.

POLISH ON CARBON BRUSHES.

Sir,—In your issue of May 23rd, in reply to query *re* overhauling a magneto, you state, "If the ends of the brushes are polished, roughen them over lightly with glass-paper."

May I bring to your notice a paper on "The High-tension Magneto," by Mr. A. P. Young, A.M.I.E.E., A.I.A.E., read before the Aeronautical Society, April, 1917, in which the author states, Part 3, Section 4. "I am informed in certain quarters a carbon brush having a highly-polished contact face is looked upon with suspicion, and in consequence it is the practice to remove the polished surface by the careful application of a file.

"This is a most pernicious habit, and cannot be condemned too strongly."

I may say that since discarding the file habit I have obtained far better results than heretofore, and am convinced that it is a point which might with advantage be brought before your readers. T. CARPENTER.

HIGHER GEARS FOR SOLO RIDING.

Sir,—In reply to "Argon," I should like to point out that a gear exists which is substantially in accordance with the requirements he sets forth.

This gear is the property of two friends of mine, who, owing to being engaged on work of national service, have been compelled to let its exploitation stand over until the end of the war. The contrivance, though of a friction type, is, as far as is mechanically possible, *frictionless*.

It is positive and so extremely simple that it may well be regarded as absolutely fool-proof. It may be used for chain, belt, or shaft drive on any class of motor vehicle from solo mount to a motor lorry.

One somewhat extraordinary feature of this variable gear is that the necessity of lubrication is practically done away with, as is also the necessity for a gear box or any other covering.

So much confidence have I in the gear that my friends are bound by promise to me that they will provide me with a specimen for use on a four-cylinder sidecar mount I am hoping to run as soon as Fritz is a back number.

R. G. TUCKETT.

AIR COOLING.

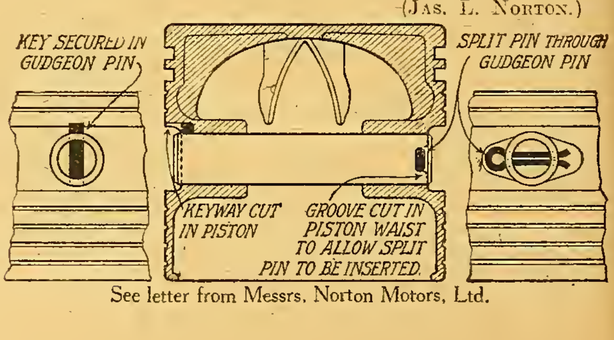
Sir,—After reading the article on "Air Cooling" by such a giant of motor cycling as "Road Rider," one wonders timidly how such a contraption as a motor cycle—bar, of course, the A.B.C.—ever proceeded ten consecutive miles at 30 m.p.h. without dissolving into horrid splashes of molten metal. It must be lovely to be able to draw beautiful diagrams with wiggly lines all around them, but somehow they do not seem to prove much. Take diagram 5, for instance—the second sketch. Having "noted the vacuum" I marvel that my machine ever fires at all. It is fitted with a hot air elbow and pipe, and draws the whole of its air supply through an inch pipe pressed against the fins in the *centre of the "vacuum,"* and it fires quite happily at 50 m.p.h. Where *does* the air come from? Again, the streamline fins look beautiful from above, but would eight or ten fins, each perhaps one-twelfth inch thick, induce the circumambient air to take a streamline form? Also would not the crude outlines of the carburetter—conveniently omitted in the diagrams—rather spoil the symmetry of the streamline shape? Does "Road Rider" know that there is one firm—whose cylinders are neither streamlined nor steel—who claim that they have never heard of one of their valves breaking in ordinary use. Now, are their machines generally considered slow? Mine is one of them.

J. M. PHILPOTT.

FIXING THE GUDGEON PIN.

Sir,—We have been interested in the various methods of gudgeon pin fastenings which have recently appeared, particularly in the issue of May 16th. We have experimented with many methods, including the type recommended by "Chinook," *i.e.*, piston ring method, and certainly cannot recommend this as a thoroughly satisfactory job. It neither prevents the pin from turning—unless the ends are slotted, forming part of the piston ring groove—nor does it prevent movement of the ring endwise. We have used narrow and broad rings, also steel wire spring rings, and have also passed a spring wire ring round the piston and through a hole in either end of the gudgeon pin, this last method being the most successful of that style of fastening; but the method which has for the past few years proved itself far and away ahead of any other we have tried—both from the standpoint of reliability and of easy removal and replacement—is that shown in the accompanying sketch. The pin is parallel and is a push fit into the piston bosses, one end being fitted with a key, which engages a keyway cut in the side of the piston boss. Passing through the other end of the gudgeon pin is a hole at right angles to the key, this, when the gudgeon pin is *in situ*, registering with a slot in the waist of the piston passing across gudgeon pin hole. An ordinary split cotter is then threaded through the end of the gudgeon pin, and lies snugly in the slot in the side of the piston. This, with the key, prevents any possibility of endwise movement, and the key prevents any turning of the pin. It will be seen how easily the whole business is removed and replaced, and there is nothing whatever liable to come loose.

NORTON MOTORS, LTD.
(JAS. L. NORTON.)


KEY SECURED IN GUDGEON PIN
SPLIT PIN THROUGH GUDGEON PIN
KEYWAY CUT IN PISTON
GROOVE CUT IN PISTON WAIST TO ALLOW SPLIT PIN TO BE INSERTED.

See letter from Messrs. Norton Motors, Ltd.

A BAFFLING EXPERIENCE.

Sir,—May I thank the readers who have been kind enough to endeavour to diagnose the trouble related by me in your issue of April 18th.

Some of your correspondents have, I fear, not had the facts as published fully in mind when replying to my letter. In reply to "A.G.C.," who writes in the issue of April 25th, I beg to say that the control wires and high-tension wire were in perfect condition and could not have been causing a short circuit.

The Lodge Co.'s suggestion has already been most admirably answered by Mr. Peasnell. It certainly would be too much of a coincidence for the rocker arm to stick when the plug was *in situ* and to work when the plug was taken out and laid on the cylinder. I think this must be dismissed as most improbable. In reply to Mr. Peasnell's query, I had no straps or knee grips round the tank, and I was using one of Lodge's umbrella terminals.

Mr. Moon's suggestion in the issue of May 2nd struck me at first as being a possible solution of the trouble, as the weather was damp, and I had been out for some hours. Under these conditions the fibre block (not bush) on the Splitdorf magneto rocker arm might have swollen. This would have caused the block to engage with the cam of the timing lever sooner and caused an early spark. It would also cause a bigger gap at the points than normal, which would probably give a weaker spark. I am anything but an expert, and am almost afraid to pen my thoughts in case I give the knowing ones much cause for mirth by some unguarded remark, but it seems to me that whether the spark was early or whether it was weak it should be accompanied (or followed, shall I say) by a shock at the plug when held, and this is what I did not get, *vide* my letter in the issue of April 18th.

It should be borne in mind that the rocker arm bush on the Splitdorf magneto is not fibre but metal-to-metal, lubricated with typewriter or clock oil, and I have never found it stiff or inclined to stick up on any occasion upon which I have tested it.

Under the circumstances, after reading the letters of those who have so kindly related their own experiences, and after an amount of mature thought on my own part, I have still to consider the instance as a baffling experience."

F. W. CHAPMAN.

AN APPRECIATION.

Sir,—One unfortunately hears so frequently of the unbusinesslike methods of the British manufacturer, and also reads so many letters comparing British machines unfavourably with American types, that I make no apology for writing to tell you of my own absolute satisfaction with a thoroughly British production used under very trying conditions, and loaded far in excess of what one might reasonably expect the machine to stand up to. I may say that, having been a rider since the days of De Dion tricycles and front-drive Werners, I am hardly a novice, and I must say I have given my present mount every care and attention.

My machine is an Allon, which I purchased slightly second-hand in 1915, it having done only a few hundred miles. I have now completed a little over 16,000 on it, riding every day and in all weathers, with a light sidecar, and for the greater part of the time with a passenger up. On three occasions have I towed home heavy C.B. combinations, and once a light car of well-known make whose differential had broken.

This little lightweight will take 20-24 stone total passenger load on any main road, and face practically any hill without overheating. I once with a very light passenger climbed Cheddar Gorge, which I hardly expected to do. Petrol consumption is just over 80 m.p.g. with two up on an ordinary give and take road, and I find the two-stroking perfect at practically all speeds.

When I first took the engine down after purchase there was a very small crack in the piston, which did not seem enough to be serious. However, after 16,000 miles this developed, so I wrote and told the makers and asked for a quotation for a new piston, explaining to them that I had no cause for complaint, the machine being second-hand when I bought it, and having more than satisfied me throughout. *By return of post* came a reply, asking me to send the engine along for overhaul. I wrote saying I could not spare it, and immediately the makers sent me free of charge a new piston, with rings, gudgeon pin, etc., and also a few minor spares that I needed. Could any firm be more courteous or prompt in their treatment of one who was not even in the first place a direct customer, and of whom they had not previously heard? I think not, and after two years' perfect satisfaction with the machine it gives me added pleasure to find the makers are as reliable as the machine they turn out.

L. F. BISHOP (Sec.-Lt. R.F.C.)

NUTS AND THREADS.

Sir,—May I ask the favour of a few lines in your valuable paper to put forward a few observations on details of British and American motor cycles? I have been wrestling for an hour and a half trying to induce a nut to screw on to a footrest bolt of a popular lightweight machine. The footrest, I may add, I was foolish enough to tap on with a hammer previously to dismantling, and damaged the thread in consequence. I have always noticed that with British machines —I have owned eight or nine—the larger bolts were either too tight or too loose a fit, and the threads were exceedingly easy to destroy. All the British machines were of the best. Now to come to the American machines. I have had four different makes, and the threads of the bolts were very hard, and the nuts always screwed up a certain distance with the fingers. Surely British manufacturers can come up to the standard of American in their bolts and threads. This, of course, is a small matter to most; but as I endeavour to do all my own repairs, and time is of consequence, I put off the fatal day of repairs for a long while, when barked knuckles and bad temper can become normal again!

Another point. I was reading your paper, and saw an 8 h.p. combination listed at £125, *lamps, etc., extra.* This sort of thing is surely not a great inducement to people, who can get an Indian—in my opinion, the finest machine made—and sidecar for a few pounds over £100, with electric lamp, electric horn, and a hood and screen thrown in. This makes a man with £100 to invest in a tip-top sidecar machine plump for the American every time.

Needless to say, I have no interest in the Indian firm, except as a heartily satisfied user.

D. KINLOCH KIRK (Capt.)

American troops in France. Negro driver and colonel passenger on a B.S.A. on the Western Front.

COMFORT IN RIDING.

Sir,—With reference to fig. 2 on page 406 of your issue of 25th April, 1918, I wish to point out that the machine illustrated was not a converted tricar, but was one of a type which was built in Newcastle-on-Tyne in 1907, the chief features of which were wheel steering, bucket seat, clutch, two-speed gear box, and hand starting. S. HUNTER.

[The inscription stated that it was *possibly* a conversion. —ED.]

A SUGGESTION—AND OTHER MATTERS.

Sir,—On reading your valuable paper of May 16th, I note you say that there are many Triumph two-stroke motor cycles in use by His Majesty's Army Overseas, and it has occurred to me that it would be rather a good thing if some of the less important and dangerous jobs on the fighting fronts were done by youths from fifteen to sixteen mounted on these handy little machines. There would be a great saving in petrol and man power, to say nothing of machines, etc. This should prove economical, and would train the boys under war conditions for the Air Service on reaching the age of eighteen.

I am very interested in any letters from your readers in regard to the four-cylinder. I once rode a Henderson for a few miles, and was charmed by the even running.

In regard to an ideal Overseas mount, I should think that the twin two-stroke made by Messrs. Butterfield, makers of the Levis, of, say, 5-6 h.p., three-speed countershaft gear, large mudguards (fully 3in. clearance), enclosed chain drive, with tank to hold not less than two gallons (made after the American style), 28in. wheels, and 3in. tyres, should make an excellent machine.

I think that all your readers should be thankful, and also proud, of their choice when they chose your paper, and I thank you, sir, for keeping the paper still as interesting as ever, and hope that you are having the tremendous success that you rightly deserve. OLD READER.

AN OCCASIONAL "KONK."

Sir,—I wonder if you or any of your readers could tell me the cause of the following mishap, which occurred to a second-hand 1912 Scott which I have lately purchased? The engine was running very badly (misfiring, etc.) when I got it, so I at once set to work and made all the joints gas-tight, cleaned up the gauzes in the transfer port covers (only single gauzes were fitted), attended to the magneto points, plugs, etc., but, as very little improvement was apparent, I decided to try another carburetter, and so fitted an adjustable jet B. and B., which I am still using. This improved the running a little, but I could get no speed or power or even running, so decided to take the whole engine down. (In this connection, may I ask if there is any "golden rule" or easy way of fitting or removing the short water connection to radiator?) On completing this operation I found that one of the cranks had sheared its key and twisted round about 90° in relation to the other. This I had put right at one of our best garages, and then I reassembled the engine very carefully, paying particular attention to making all joints absolutely gastight.

The engine started up at the second or third kick and ran smoothly and well, and I thought my troubles were at an end. Not so, however, for I was troubled by an intermittent and most violent "konk," which occurred at any speed and with any setting of the levers or timing of the ignition. Sometimes it would occur every one hundred yards or so and at others I might ride perhaps four or five miles without it happening, but then it would suddenly occur again—just a single, violent, ringing "konk" from the poor engine's vitals. The strange part was that the running seemed unaffected and continued even. I tried timing the magneto slowly, and I also tried lowering the level of the petrol to about ⅛in. below the top of the jet. I could not obtain the Reliance plugs recommended for Scotts, so fitted two new Hobson Pognons. Returning home one day, I had just made up my mind to try fitting double gauzes in the transfer ports in case my trouble should be due to explosions in the crank case, but all at once the engine jammed with one of the usual "konks," and investigation disclosed the sad fact that the cranks had again twisted, and were in almost the same position as before—90°. I have again had the damage repaired at considerable expense, and have just got the machine running again and have fitted the extra gauzes, but a trial run revealed that the same old trouble was still in existence, and now I am at a loss to know how to account for it. As I am too far away to await *The Motor Cycle's* valuable advice, I shall continue to experiment on my own in the meanwhile, but I should nevertheless be very grateful for any tips. I might mention that I have owned and ridden machines of most makes on the market, from 2 h.p. singles to big four-cylinder machines, and so have considerable experience, though the Scott is my first two-stroke, and so is a bit of a puzzle yet!

Graaf Reynet, South Africa. ALLAN R. BIGGS.

AVERAGE SPEED.

Sir,—May I butt-in with a few words on the paces of the Sunbeam?

A reader states that 52 m.p.h. is the fastest speed he has attained on a standard 3½ h.p. Sunbeam. I have a solo 3½ h.p. T.T. 1916 Sunbeam, which, standard save for a re-timed spark, will touch 58 m.p.h. by Watford speedometer—top gear 5¼ to 1 (Sunbeam "sidecar" gear).

Why do the super-experts all dismiss the readings of speedometers? Perhaps the manufacturers of the (say) Stewart, Watford, Cowey, and Jones will hand in a few winged words on the subject. I have tested a Watford against a Jones—result, 47 m.p.h. in each case!

It appears that both the A.B.C. and the Norton are the fastest machines on earth of their power. Perhaps Captains Hodgson and Lindsay will arrange a dust-up, and "E.K., R.F.C.," may make an "eternal triangle" of it! All the arguments on earth will do no good; but a trial of the three machines may have some effect. A cup might even be offered to the winner.

I am very interested in this discussion. After many troubles and experience of many different makes, I have at last what I consider the finest all-round, no-trouble machine on earth—in a word, perfection; and I would like to hear of "E.K." proving his claim. A.H.

WHAT WE SHALL GET.

Sir,—"Ixion" has often referred to the high-efficiency engine of small cubic capacity and low weight. He whets one's appetite with "very wee machines streaking up the mountain road," presumably low geared, and depending for their speed on a great number of r.p.m. I have owned many very wee machines, the best of their class, which included two and four-stroke singles and twins, and have pampered and humoured them to the best of my ability, having fed them reasonably with the oil best suited to their individual needs. Some of these babies I have scrapped after the first few hundred miles; others I have run close on 5,000 miles before parting with them. Some of these "new brooms" were capable of streaking up North End Road, Hampstead, on top gear at the appalling speed of 18 m.p.h. "all out," but it was not long before subsequent rides up the same hill had to be negotiated on second gear, or a slipping clutch, and their embarrassment in the shape of overheating, etc., was distressing to witness. There is no doubt that during the period the small "'bus" remains in good tune it is quite a useful mount for short distances, but, apart from the usual drawbacks of small wheels and tyres and short life of the engine, the great majority of small engines possess one serious defect. I refer to the intolerable nuisance of having to decarbonise the cylinders every few hundred miles. However careful one may be in regulating the lubrication, jet, etc., the fact remains that the small engine loses tune (power) more quickly than does that of greater cubic capacity, which I believe is due chiefly to the difference in gear and r.p.m. An 8 h.p. twin I owned in 1913 ran for 3,600 miles before a slight falling off in power occurred. Opening the throttle an extra ⅛in. then gave me all the necessary reserve power to carry on for a further thousand miles. I then decarbonised the cylinders, not because of "knock" occurring, but for the reason that I felt it was cruelty to dumb animals to continue.

A small engine (one of "Ixion's" post-war "babies") will require to be designed exceptionally well and run very cool indeed to give the same satisfactory results.

My present baby twin, with but a few miles to its credit, has more than once caused me grave anxiety when laboriously dragging me up a steep hill on second gear. The engine revs. are simply terrific, and I fully expect one day to see the thing turn inside out with "revvingitis."

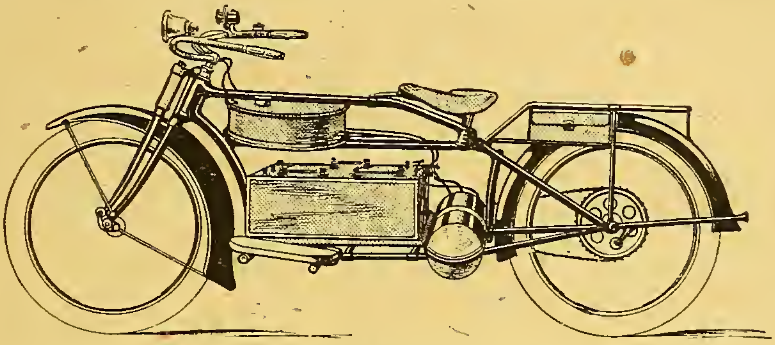
Golder's Green. VIC.

An Electric Motor Cycle.

DETAILS OF AN INTERESTING NORWEGIAN EXPERIMENT.

FROM a Norwegian source comes a description of a motor cycle driven by electricity, which has been invented by Johannes Bjorge, of Christiania, Norway.

We are in some doubt as to whether it is a completely designed electric cycle or an ordinary American motor cycle converted for the purpose. It appears to be the usual type of frame for a four-cylinder engine with accumulators in place of the engine unit, and an electric motor mounted in place of the usual countershaft gear box driving the back wheel direct by a chain. The elliptical box in place of the tank contains the controllers and regulating devices.



A motor cycle designed to be driven by electricity, the invention of Johannes Bjorge, of Christiania, Norway.

A trial demonstration was recently given before a number of Norwegian motor cycle representatives, and their reports are favourable.

The weight is about the same as that of an ordinary motor cycle. There is said to be sufficient power in the storage battery fitted for about forty-five miles riding, but the inventor is at work on a specially constructed battery, which he hopes will give a range of seventy-five miles without recharging. The maximum speed is about forty miles per hour on the level. The running cost of the machine is said to be about four miles for one penny. A further development upon which the inventor is working is a permanent addition to the machine to facilitate recharging wherever electric current is available. We are not convinced that there is anything particularly new or novel in this attempt to produce an electrically driven machine, but it certainly affords possibilities in the way of converting a motor cycle to avoid the use of petrol or coal gas. Whether a storage battery of any efficiency could be temporarily accommodated in place of an ordinary engine unit, single or twin, and whether a lightweight motor of sufficient power could be driven therefrom, are points in doubt. We imagine that many English riders and makers have considered the *pros* and *cons* of this method of driving a motor cycle, and possibly have arrived at the decision that the probable result is not worth the expense. The electric motor cycle is still some way ahead in the future.

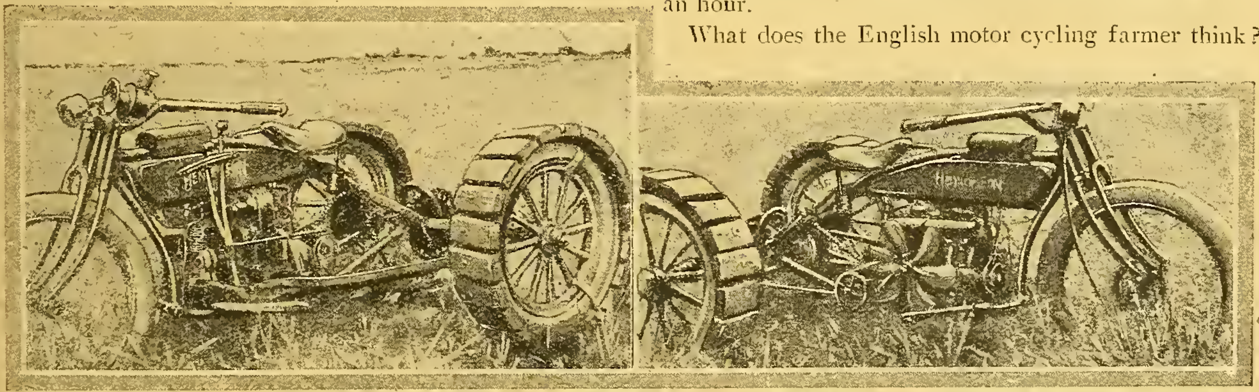
There is no reason why it should not come, but steam may turn out to be a serious opponent.

A Motor Cycle Farm Tractor.

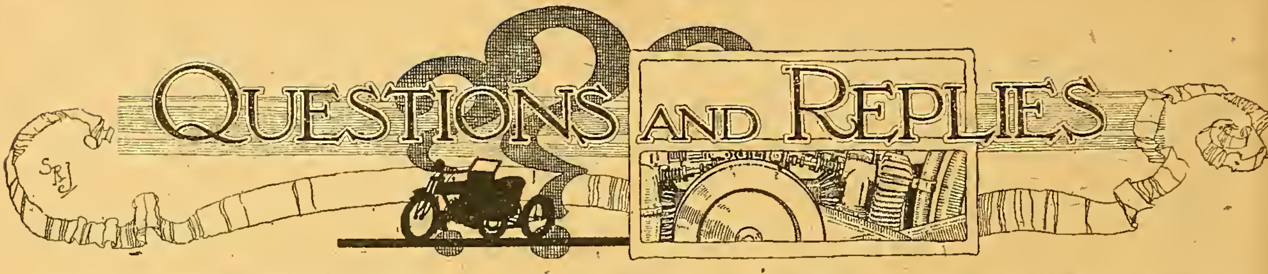
AN American motor cyclist is using his 1917 Henderson for the cultivation of pea nuts. The rear end of an old electric auto is arranged with detachable grips on the tyres, and an ingenious system of gearing gives him a low gear ratio of 20 to 1, with a working speed of two and a half miles per hour. There is no difficulty in pulling a 12in. plough, but it is best adapted to pulling a cultivator or a harrow. By hooking the beam of the plough close to the differential, and setting the shear so that it has a tendency to drag down on the tractor wheels, he has plenty of traction.

The arrangement is readily detachable, and the machine can be converted into a solo mount in half an hour.

What does the English motor cycling farmer think?



A motor cycle tractor is certainly an innovation, and although about the last use to which one would think a motor cycle should be put it has proved a success. Note the cooling fan, which was effective in keeping cool the Henderson four-cylinder engine.



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Books.

Have you any books published on the timing of engines and magnetos? If so, kindly let me know.—P.

"Motor Cycles and How to Manage Them" deals with all matters connected with motor cycle engines, and "Electricity and the Motor Car" is a complete and exhaustive book on magnetos, as well as other forms of ignition. The price of the former is 1s. 10d., and that of the latter 2s. 10d., both post free from the publishers of *The Motor Cycle.*

Driving from the Sidecar Seat.

(1.) What, in your opinion, would be the best and easiest motor cycle to convert so that it could be driven from the sidecar? (2.) Would a Royal Enfield be suitable? (3.) Do you think a machine fitted up in this manner would be satisfactory and keep the road as well as if it were driven from the saddle?—A.S.

(1 and 2.) There are so many aspects to be considered in the conversion you suggest that we cannot say if one machine would be more adaptable from every point of view than another. However, the 6 h.p. Royal Enfield would be as good as any. (3.) The question of service to be obtained from such a machine is rather a controversial one, and has been several times treated in *The Motor Cycle.* We should think it would hold the road better with all the weight in the sidecar than if it were driven from the saddle.

Illumination from Magneto Current.

(1.) Is it possible to use a magneto on a $2\frac{3}{4}$ h.p. Douglas motor cycle for lighting the front and rear lamps? (2.) If so, how is the wiring carried out, and what connections are made to the magneto? (3.) What voltage lamps are suitable? (4.) Should they be carbon or metal filament lamps? (5.) Does the system harm the magneto? (6.) Is the system satisfactory? (7.) Can you give me a recipe for a petrol proof varnish?—P.F.

(1.) Yes. (2.) You should refer this question to the makers of the device, Messrs. F.R.S. Lamps, Ltd., Beam Works, Pershore Street, Birmingham, who can supply you with a complete outfit. (3.) Four volts and of low amperage. (4.) Metal filament is preferable. (5.) No; it does no harm to the magneto. (6.) Yes; but the light is only moderate (7.) There are several proprietary petrol-proof varnishes on the market. We think that shellac dissolved in acetone would suit your purpose

Petrol Starting Jet.

I should be obliged if you would inform me if a jet supplying petrol tapped into the induction pipe of a $3\frac{1}{2}$ h.p. Rudge, fitted with Senspray carburetter, would enable one to start the engine if the levers were kept in a position to avoid drawing paraffin from the carburetter jet. It would simplify the use of paraffin very much, as it is very messy draining the float chamber and refilling with petrol. The engine runs all right on paraffin when once started. —J.J.A.

Yes; if the pipe supplying the petrol to the induction pipe were fitted so as to project into this pipe about $\frac{3}{16}$in., and suitable provision for air supply and jet were made.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD

Retiming an Old Model.

I have dismantled and reassembled the engine of a 1911 $3\frac{1}{2}$ h.p. Rex to replace a damaged timing pinion, and now I cannot obtain correct firing owing to the timing being incorrect. Would you be good enough to state what is the proper timing for both ignition and valves?—R.M.L.

The following is approximately the correct setting for a $3\frac{1}{2}$ h.p. engine. It is, however, possible that experimenting might provide some slight improvement. The exhaust valve should be down on its seat at the termination of the exhaust stroke. If you set it that way the valve will commence to open at the right time. The inlet valve should begin to open when the piston is at the top dead centre of the exhaust and inlet strokes, and should be closed when the piston has travelled $\frac{3}{8}$in. upwards on the compression stroke. Magneto timing: Place the piston exactly on top dead centre of the compression and firing strokes and connect up the magneto drive with the points of the contact maker just about to separate, and the ignition lever fully retarded.

Using Paraffin.

I have a 6 h.p. Rex-Jap twin motor cycle. Is it possible to make this machine run at all efficiently on paraffin or three parts paraffin to one part petrol? If so, will you please tell me how to do it? Is there an efficient vaporiser for such a machine?—G.A.C.

Yes, it would be quite possible to make the machine in question run on paraffin. It is necessary, first of all, to have a hot air intake to the carburetter, and perhaps to wind the fuel pipe, say, twice round the head of one of the cylinders, so as to heat the fuel before it reaches the engine. After starting on petrol the machine ought then to run satisfactorily; or you might fit a vaporiser, of which there are several on the market.

Garage Morality.

On August 2nd, 1917, a provincial garage accepted a repair to the magneto on a Scott motor cycle. This repair was completed in about two months. Since then, through negligence, the crank case has been punctured and piston broken. I have made visits, also repeated applications, for the machine to be returned in running condition; but the garage proprietor says he is too busy on war work to reassemble it, but will let me have it in parts. I have a permit allowing me to use petrol for business purposes. The machine, which has been in this man's care the whole of the time, has depreciated £20 in appearance, through being exposed to the weather. Will you please advise me how to lay a claim, and what chances I have of success?—Perplexed.

As far as we can say, without actually seeing your machine and without hearing the garage proprietor's version of the case, we should certainly imagine you have good cause for complaint and should have no difficulty in securing adequate satisfaction through the courts. Have you suggested to the garage proprietor that you will be compelled to take legal proceedings if he does not adopt a more reasonable attitude? If you have not done so, you might suggest this to him; and if it has no effect, put the matter in the hands of a local solicitor. If you take the matter into court, you will have to prove to the satisfaction of the judge that the damage to the machine is due to the negligence of the repairer, and that he has not taken reasonable precautions with your machine, and this, we should imagine from your letter, you will have no difficulty in doing.

Strength of Magnets.

I have a magneto, the magnets of which, I think, are run down. Will you please tell me the way to test for weak magnets, also the name and address of a good firm who will remagnetise these?—G.A.E.

There is only one way by which you can test the strength of magnets, and that is by holding a steel article against them, with armature in a certain position, and noting their relative pull in comparison with magnets which are known to be well magnetised. Magneto machines seldom lose magnetism unless they have had the armature removed from the tunnel without a "keeper" being placed across the magnets. The only indication of weakness is that the magneto will start the engine only with difficulty, and will give a very weak spark at the plug when the engine is rotated. If the magnets want remagnetising, send the whole magneto to its makers, whoever they may be. The trouble is far more likely to be due to a faulty contact maker.

Motor Cycle for Business.

I am about to purchase a motor cycle to be used for business purposes, *i.e.*, I live about six miles out of a town where there is no convenient rail, etc. (1.) I presume there is nothing to prevent my accepting a friend's supply of petrol? He is called to the Colours, and has given me his supply—the accumulation of several months. Am I likely to be pulled up by an official of any sort to produce a petrol licence? (2.) What taxes am I liable for, and in the event of my purchasing a second-hand mount shall I be liable for the Inland Revenue tax, even though this tax is not due till January in each year, and the present owner of the machine has paid the tax for this year? (3.) What, in your estimation, would be a fair price to pay for a combination (cycle and sidecar), second-hand? (4.) I have been told on no account to purchase a machine of earlier type than 1914. Is this correct, do you think? (5.) Have you ever had any complaints as to unfair treatment of purchasers by advertisers in your journal?—A.M.

1.) Your friend acted illegally in giving you petrol, and you also in accepting it; but this will not affect the legality of your using the spirit. The Motor Spirit Restriction Order entitles licence holders and others who can obtain motor spirit to use it for business and also for other purposes when no other reasonable means of transit are in existence. (2.) The Inland Revenue licence is 20s., driving licence 5s., and registration 5s. in the case of a new machine or 1s. for the transfer of registration if a second-hand one. You are liable for the Inland Revenue licence within twenty-one days of using the machine on a public road. (3.) So much depends on the make and age of the machine that we cannot answer this query, but a good second-hand machine should be obtained for £50. (4.) If the machine has had little wear, a 1912 is not too old. (5.) Yes. The best safeguard is the deposit system.

Joining a Mechanical Unit.

Can you tell me if I can get into the R.E. or R.A.F. as a despatch rider, or the M.T., A.S.C.? I have passed two D.R.'s tests on previous occasions, but was rejected by the doctor in each case. Later I was graded C1, but have held Tribunal exemptions, as I have been managing my mother's business, owing to the depleted staff. Now I am Grade 1, and shall not be called up until after July 1st. My age is twenty-three.—C.H.W.

The only thing for you to do is to apply to your local R.O., or, for that matter, to any R.O. who has vacancies for despatch riders if your own R.O. has no such vacancies. As you have passed the D.R. tests, you ought to have no difficulty in securing the position you require, if you can find a vacancy.

The Paper Restriction Order

"RETURNS" PROHIBITED FROM JUNE 24TH.

Now necessary for readers to give a definite order for "The Motor Cycle" either to a newsagent or the publishers.

An official Order has been issued by the Board of Trade which prohibits the system of supplying newspapers on "Sale or Return."

This comes into force on JUNE 24th, and after that date only those readers who have given standing orders can be sure of obtaining their copies of *The Motor Cycle.*

In the past it has been the custom to allow newsagents to return unsold copies and this enabled them to hold supplies for the convenience of travellers and other occasional purchasers.

Under the new Order this custom must cease, and newsagents obviously cannot be expected to risk having unsold copies left on their hands. In future they will take enough copies to supply definite orders only.

Readers who have not already done so should give their orders for "The Motor Cycle" at once and thus avoid disappointment.

Timing a Two-stroke.

(1.) Can you tell me if the following timing is correct for a 2¼ h.p. New Hudson two-stroke? I am told to set the piston ¾in. from the top on compression. Is not ¾in. a great deal, and would this be with contact breaker retarded or advanced? What is meant by "on compression," as I thought, in a two-stroke, the piston was "on compression" at the top of every stroke? (2.) Can you tell me what would be a suitable size of accumulator for use on a 2¼ h.p. two-stroke, also the size of bulb to use with it, and how many hours light it would give on a charge?—T.S.McB.

(1.) We should say that for contacts to be about to separate with piston in the position indicated, the contact breaker case would be fully advanced. "On compression" evidently indicates that the piston should be rising on the compression stroke, and not falling on the firing stroke. (2.) A forty ampère-hour Fuller "Block" accumulator should give twenty hours' continuous light for two small bulbs taking slightly less than one ampère each. Four-volt bulbs must be used with a four-volt battery.

READER'S REPLY.

Carburetter Flooding.

Re your answer to "R.F.A." in *The Motor Cycle* of May 9th, regarding the waste of petrol at the main air intake of the Indian carburetter, the fault is in the sluggish action of the needle. Your correspondent will find that slightly enlarging the hole in the carburetter cover will give more looseness and swing at the top of the needle, and he will get a livelier action and a quicker cut off of the petrol. I have ridden Indians since 1913 and had the same experience, no doubt caused by the difficulty in getting the needle into its exact position when reassembling, the needle being bent when screwing down the induction pipe. Also I would advise the permanent removal of the cap over the end of the needle if this is still in position. The inlet valves need no particular adjustment, but the springs must always be kept new and strong. Let him try this, and he will be surprised at the vim of his engine. With congratulations on the success with which you sustain the interest of *our* paper—E. R. MITCHELL.

EXPERIENCES WANTED.

"G.R." (South Wales).—Radco two-stroke. Speed, hill-climbing, and petrol consumption.

"F.B." (Kent).—Searle unburstable inner tube. Resiliency, wear, and puncture-proof qualities.

RECOMMENDED ROUTES.

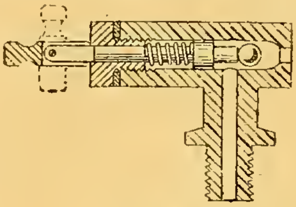
COVENTRY TO BRADFORD-ON-AVON.—G.S.
Coventry, Warwick, Stratford-on-Avon, Evesham, Teddington Cross Hands, Cheltenham, Painswick, Stroud, Nailsworth, Bath, Bradford-on-Avon.

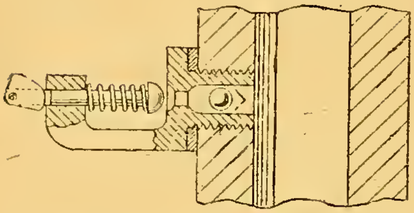
LOUGHBOROUGH TO SKEGNESS.—E.W.
Loughborough, Melton Mowbray, Grantham, Sleaford, Tattershall, Spilsby, Burgh, Skegness.

PATENTS by Eric W. Walford

Auxiliary Air Valve for Two-strokes.

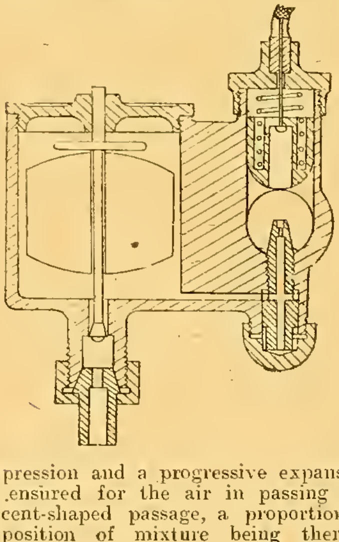
This invention relates to a non-return valve intended to be adapted to admit air to the transfer passage of a two-stroke engine. The air passes into the cylinder in advance of the mixture. Means are also provided whereby the driver is enabled to open or close the valve by external means. The device consists of a ball valve which, when pressed against the smaller orifice by the operating rod, is closed. Alternate applications of the invention are illustrated.—Henry Calvert, Dalton-in-Furness, No. 111,918, December 20th, 1917.





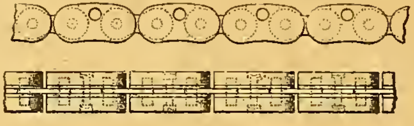
A Carburetter.

This invention consists of a carburetter having the lower part of the sliding member shaped hemispherically, while the sprayer jet is in the form of a truncated cone, whereby a progressive compression and a progressive expansion are ensured for the air in passing the crescent-shaped passage, a proportionate composition of mixture being thereby produced.—Victor Pons, Lyons, France, No. 100,276.



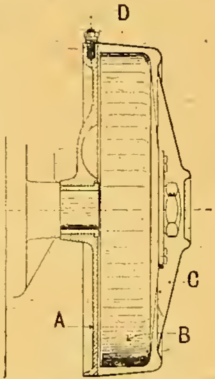
A Link Belt.

A V belt of the link type, in which friction producing links are connected by metallic links. Each frictional link is made with two non-stretchable, non-metallic elements situated on the opposite sides of the ends of the adjacent metallic link, and have apertures to receive the pivot pins of the metallic link.—R. P. Champney, Worcester, No. 111,824.



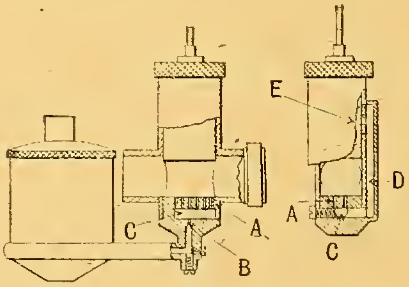
Flywheel Magnetos.

The flywheel magneto is a known device, and comprises a fixed back plate, which carries the contact breaker mechanism, the condenser, the coil, etc., and a front flywheel member, which is mounted on the shaft and carries the permanent magnet. This invention is characterised by the back plate being extended beyond the flywheel member and having a light casing secured to it, which entirely encloses the flywheel member and all the parts embraced between it and the back plate. A is the back plate, B the flywheel member, and C is a dished stamping secured to the back plate by studs and nuts D.—The Villiers Co., Wolverhampton, and G. Funck, Coventry, No. 111,391.



New Carburetter Design.

In this carburetter design it is intended that the liquid fuel be enabled to accumulate when the engine is stationary in a well C, which is in communication with a straight through chamber. In this chamber a sliding piston throttle is incorporated. In the well is located a perforated member A, which acts as an atomiser above the jet B. The well C is in communication with the atmosphere by a conduit D, which is made to communicate with the throttle barrel by a series of perforations E, so that when the throttle is raised the supply of air to the conduit is reduced.—Edwin Hutchinson, Sutton-in-Ashfield, No. 109,505, September 20th, 1917.



SPARKLETS

American Excelsior Spares.

We understand that it is possible to obtain spare parts for the American Excelsior motor cycle from Wm. J. de Greeuw, 27, Maddox Street, Regent Street, London, W.1.

Change of Address.

With reference to the ingenious back springing device and detachable wheel, the invention of Mr. David Levy, which we described and illustrated in *The Motor Cycle* of February 21st, we have to announce that Mr. Levy's address is now at 2, Christchurch Road, Streatham Hill, London, S.W.2, instead of that mentioned in the article.

North British Rubber Co.

The great extension of the business of the North British Rubber Co., Ltd., in the Midlands has rendered it necessary for them to remove from Barwick Street, Birmingham, to more commodious premises, and they are now installed at Clincher House, 158, Gt. Charles Street, to which address all communications for Birmingham and district should be sent.

Catalogue Received.

Douglas Motors, 1918. A tastefully got up catalogue illustrated by pictures of historical interest in the neighbourhood of Bristol, the home of the Douglas. Also profusely illustrated with photographs of the latest models of this famous motor cycle, which has done so much in war service for the British and Allied Armies. All the well-known types—the War Office model, the touring model, the lady's model, and the 4 h.p. machine—are illustrated and described.

Birmingham Municipal Bank.

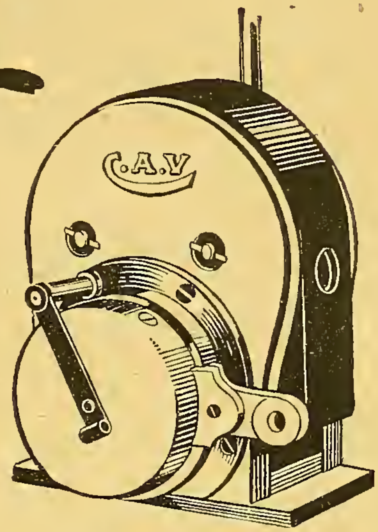
The Birmingham Small Arms Co. recently offered the sum of £100, divided into six prizes, to be drawn for by depositors in the Birmingham Municipal Bank. The draw, which took place recently, resulted as follows: First prize, £50, J. W. Snead; second, £25, F. Atkins; third, £10, C. Sprason; fourth, £5, Amy Armstrong; fifth, £5, F. F. Ellis; sixth, £5, G. H. Dangerfield. Councillor Hallas attended the draw, and addressed the workpeople on the value of thrift.

Conversion Tables.

We are in receipt of two useful conversion tables from the Hoffmann Manufacturing Co., Ltd., Chelmsford, Essex, manufacturers of steel balls and roller and ball bearings. These conversion tables are for the purpose of converting inches to millimetres, millimetres to inches, also pounds avoirdupois to kilos, grains to grammes, and metric tons to tons. In view of the possibility of the metric system being adopted in this country, and of the large extent to which it is used in modern engineering, these conversion tables should be of great value.

Trustworthy Service!

The C.A.V. MAGNETO is now undergoing the severest test of all—ACTIVE SERVICE —Proving daily its splendid reliability in all climates and under all conditions



C.A.V. Magnetos

BRITISH THROUGHOUT

C. A. VANDERVELL & CO., LTD.,
Electrical Engineers :: ACTON, LONDON, W.3
Members of the British Ignition Apparatus Assn.

"You Naughty Dog

Look what you've done to my brand new Mac, and I couldn't mend it if I didn't know of

Mend-a-Tear"

PATENT

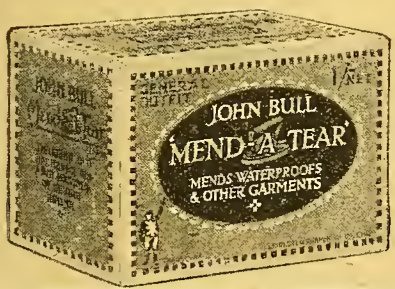
And amongst the readers of *The Motor Cycle* there must be thousands of jags like that—jags which only that wonderful new material which "mends without stitches" can effectively repair. Are you one of these readers? and do you know it? If not, remember it is sold in two styles—KHAKI AND GENERAL—

at 1/- per Carton.

and that you can procure a sample free in return for a 1½d. stamped addressed envelope.

LEICESTER RUBBER
CO., LTD.,
10, Granby Mills,
LEICESTER,

Makers of the renowned John Bull Cycle and Motor Cycle Tyres.



There's never a tear you can't repair with Mend-a-Tear.

When halcyon days return, DON'T FORGET the reliability of the

HOBART

MOTOR BICYCLE

is the result of 15 years' manufacturing and riding experience, and make a point of securing early delivery of one of these handsome, handy, and reliable machines.

HOBART BIRD & CO., LTD.,
Hobart Works, Coventry, England.

Established 1884.

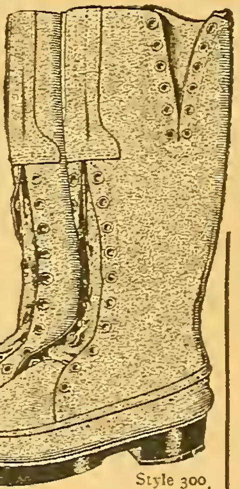
Telegrams: "Hobart, Coventry."

SPECIAL OFFER
TO ALLOTMENT HOLDERS
and all Land Workers.

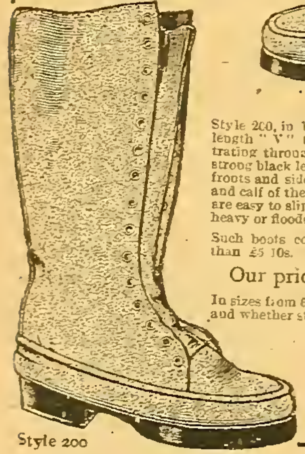
Allotment Holders and all who work on the land require stout waterproof boots that will withstand hard usage, and keep their feet warm and dry on rain-soake soil. It is impossible to obtain such boots in the shops except at exorbitant prices. Every man doing work on the land should therefore seize the present opportunity of obtaining a pair of really high-grade

WATERPROOF BOOTS FOR LAND WORK.

These boots are guaranteed to be repaired Field Trench Boots, made of the finest Government leather with stout new soles and heels, and guaranteed sound uppers of first-class workmanship, material, and finish.



Style 300.



Style 200

Style 200, in brown leather of superb quality, have full-length "V" tongues, which prevent the wet from penetrating through the lace-holes. Style 300, in stout and strong black leather are pull-on boots with special lace up fronts and sides to ensure a comfortable fit at the ankle and calf of the leg. Both have pull-on loops at back, and are easy to slip on and off. They are ideal for rough use on heavy or flooded soil in bad weather.

Such boots could not be obtained in the shops for less than £5 10s.

Our price **21/-** postage 1/- extra.

In sizes from 6 to 10. Send Postal Order and state size, and whether style 200 or style 300 is required.

Dept. 99,
THE LONDON ARMY BOOT CO.,
3, Victoria Avenue, Bishopsgate St.,
LONDON, E.C.1.

WHY?

Why do our advertisements pay? Not only because we make them as attractive as possible, but because we make our terms of dealing as attractive and as fair as possible, and because the prices at which we sell our goods are also attractive.
Write for full lists of 150 machines and 50 cars, and ask for details of our instalment scheme, by which you can reserve a good new or second-hand machine for after the war. We also undertake exchanges.
Remember that we will exchange any machine bought within three weeks of purchase if not suitable.

SELECTION FROM STOCK:

1.	**ALLON,** 1916, 2-speed, 2-stroke, good order	27 gns.
2.	**A.J.S.,** 1915, 2¾ h.p., 2-speed, clutch, kick start	39 gns.
3.	**AMERICAN EXCELSIOR,** 1917, Combination, as new	85 gns.
4.	**AMERICAN EXCELSIOR,** 1915, Combination, 3-speed	59 gns.
5.	**BAT-J.A.P.,** 1914, 6 h.p., 3-speed, 2-seater Sidecar	39 gns.
6.	**BRITISH EXCELSIOR,** 1916, 2-speed, clutch, 2-stroke	25 gns.
7.	**B.S.A.,** 1913, 3½ h.p., 2-speed	25 gns.
8.	**CLYNO,** 1916, 2-speed, clutch, 2-stroke, as new	28 gns.
9.	**COVENTRY EAGLE,** 1916, 2-speed, 2-stroke, as new	27 gns.
10.	**CALTHORPE-J.A.P.,** 1915, 2¾ h.p., 2-speed, clutch	24 gns.
11.	**CALTHORPE,** 1915, 2-speed, 2-stroke	24 gns.
12.	**CLYNO,** 1915, 6 h.p. Combination, spare wheel	59 gns.
13.	**CAMPION-J.A.P.,** 1915, 4 h.p., Jardine gears	37 gns.
14.	**CAMPION,** 1916, 2-speed, 2-stroke	24 gns.
15.	**CRESCENT,** 1916, 2-speed, 2-stroke, Binks, very fast	25 gns.
16.	**DOUGLAS,** 1916, 4 h.p., 3-speed, Colonial T.T. model	59 gns.
17.	**DOUGLAS,** 1916, 2¾ h.p., 3-speed, as new	48 gns.
18.	**DOUGLAS,** 1915, 2¾ h.p., 2-speed, Binks, very fast	37 gns.
19.	**DOUGLAS,** 1914, 2¾ h.p., 2-speed	33 gns.
20.	**DOUGLAS,** 1913, 2¾ h.p., 2-speed	28 gns.
21.	**DOUGLAS,** 1912, 2¾ h.p., 2-speed	22 gns.
22.	**ENFIELD,** 1916, 6 h.p., standard model Combination	69 gns.
23.	**ENFIELD,** 1916, 6 h.p., Colonial model Combination	72 gns.
24.	**ENFIELD,** 1916, 3 h.p., 2-speed, as new	42 gns.
25.	**ENFIELD,** 1915, 3 h.p., 2-speed	33 gns.
26.	**F.N.,** 1913, 5-6 h.p., 2-speed	29 gns.
27.	**GRANDEX-PRECISION,** 1915, 2¾ h.p., 2-speed, clutch	21 gns.
28.	**HOBART,** 1915, 2-speed, 2-stroke	24 gns.
29.	**HOBART,** 1915, 2¾ h.p., 3-speed, Lady's model	27 gns.
30.	**HARLEY-DAVIDSON,** 1915, 7-9 h.p., 3-sp., coach Sidecar	65 gns.
31.	**INDIAN,** 1916, 7-9 h.p., T.T. road racer, disc wheels	45 gns.
32.	**INDIAN,** 1916, 7-9 h.p., T.T. road racer	42 gns.
33.	**INDIAN,** 1914, 7-9 h.p., 2-speed Combination, good order	52 gns.
34.	**INDIAN,** 1914, 7-9 h.p., spring frame, 2-speed, clutch	36 gns.
35.	**INDIAN,** 1915, 5 h.p., 3-speed, T.T.	39 gns.
36.	**INDIAN,** 1915, 7-9 h.p., T.T. road racer, clutch	37 gns.
37.	**INDIAN,** 1914, 7-9 h.p., T.T. road racer, clutch	29 gns.
38.	**IVY-PRECISION,** 1915, 4¼ h.p., 3-speed	32 gns.
39.	**J.H.,** 1916-17, 8 h.p., M.A.G., Sturmey countershaft, coach Sidecar	67 gns.
40.	**JAMES,** 1914, 4¼ h.p., 3-speed	32 gns.
41.	**KERRY-ABINGDON,** 1914, T.T., 4 h.p.	24 gns.
42.	**MATCHLESS,** 1915, 8 h.p., 3-sp. coach Combination, J.A.P.	59 gns.
43.	**MATCHLESS,** 1913, 6 h.p., 2-sp. coach Combination, J.A.P.	36 gns.
44.	**MOTOSACOCHE,** 1916, 3½ h.p. twin, M.A.G., Enfield gears, as new	44 gns.
45.	**MOTOSACOCHE,** 1914, 3½ h.p. twin, M.A.G., Enfield gears	32 gns.
46.	**METRO.,** 1916, 2-stroke, sloping tank, as new	22 gns.
47.	**NEW HUDSON,** 1915, 3½ h.p., 3-speed, New Hudson Sidecar	39 gns.
48.	**NEW HUDSON.** 1915, Big Six, 3-speed, New Hudson Sidecar	52 gns.
49.	**NEW HUDSON,** 1914, Big Six, 3-speed coach Combination	46 gns.
50.	**NEW IMPERIAL,** 1915, 2¼ h.p., J.A.P., 2-speed	24 gns.
51.	**NEW IMPERIAL,** 1916, 2¾ h.p., J.A.P., 2-speed, as new	29 gns.
52.	**N.S.U.,** 1913, 3 h.p., 2-speed, clutch	21 gns.
53.	**O.K.-J.A.P.,** 1916, 2¾ h.p., 2-speed, clutch	25 gns.
54.	**PREMIER,** 1915, 2½ h.p., clutch, as new	24 gns.
55.	**PREMIER,** 1915, 3½ h.p., 3-sp. countershaft Combination	45 gns.
56.	**PREMIER,** 1914, 3-speed coach Combination	35 gns.
57.	**PREMIER,** 1913, 3-speed Combination	32 gns.
58.	**PREMIER,** 1914, 3½ h.p., 2-speed countershaft	29 gns.
59.	**PREMIER,** 1913, 3½ h.p., 2-speed, clutch	24 gns.

Any machine sent on "The Motor Cycle" deposit system.

31 & 40b, High Street, HAMPSTEAD.

RIDER TROWARD & Co

MISCELLANEOUS ADVERTISEMENTS.

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DVERTISEMENTS in these columns
'irst 12 words or less 1/6, and 3d. for every
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ments should be made payable to
FFE & SONS Ltd., and crossed & Co.
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or St., E.C.4), by the first post on Friday
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te the number which is printed at the end of
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which it appeared.
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NUMBERED ADDRESSES.

r the convenience of advertisers, letters may be
ssed to numbers at "The Motor Cycle" Office.
this is desired, the sum of 6d. to defray the cost of
ration and to cover postage on replies must be added
advertisement charge. Only the number will appear
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☞ DEPOSIT SYSTEM.

sons who hesitate to send money to unknown persons
deal in perfect safety by availing themselves of our
sit System. If the money be deposited with "The
Cycle," both parties are advised of this receipt.
time allowed for a decision after receipt of the
is three days, and if a sale is effected we remit the
nt to the seller, but if not we return the amount
depositor, and each party to the transaction pays
ge one way. For all transactions exceeding £10 in
a deposit fee of 2s. 6d. is charged; when under
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le to Iliffe & Sons Limited.
letter "D" at the end of an advertisement is an
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SPECIAL NOTE.

eaders who reply to advertisements and receive no
r to their enquiries are requested to regard the
as an indication that the goods advertised have
y been disposed of. Advertisers often receive so
enquiries that it is quite impossible to reply to each
y post.

MOTOR CYCLES FOR SALE.

A.J.S.

S., 1914, 6h.p., and sidecar (C.B.), splendid order;
£60.—Thwaites, 55, High St., Cleator Moor. [5660

W Bros., Guildford, A.J.S. agents since 1912,
lways have dependable second-hand machines.
[5369

S., 1913, 2¾h.p., 2-speed, kick starter, new tyres,
cetylene lamp; £40 cash.—Howell, 45, Oakfield
Newport, Mon. [X5036

S., 1917, 6h.p., 3-speed, special War Model, fitted
with 700×80 tyres; £92.—Exeter Motor Cycle Co.,
Bath Rd., Exeter. [3520

S. Late 1913 6h.p. Combination, Swan S.C., in
good condition, electric light; £45.—Boyce, 27,
ike Lane, Hornsey. [5705

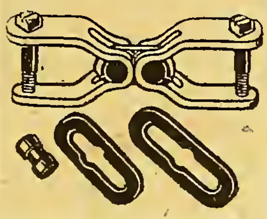
S., 2¾h.p., 1912, 2-speed, hand clutch, used very
little, in splendid condition, lamps, speedometer;
or exchange bigger power.—Box 1,984, c/o *The*
Cycle. [X4932

S. 1916 4h.p. Twin, 3 speeds, kick start, spring
forks, Lucas head lamp, tail, and horn, done about
miles; £67.—Maudes', 100, Gt. Portland St.,
n, W.1. [5735

S. Motor Cycles.—Immediate delivery of Military
model, complete, detachable wheels, 700×80 tyres;
; no permits required.—P. J. Evans, sole agent
irmingham and district, 87-91, John Bright St.,
ngham. [5675

Forward Facts
No. 1.

Belt service and Fastener Efficiency are inevitably allied—the best belt becomes no better than the worst belt if the fastener fails.



Therefore you should fit the

Forward

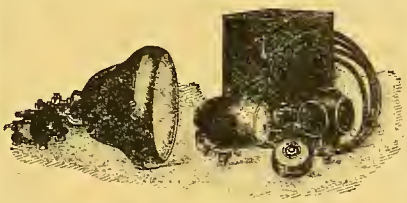
the fastener that NEVER fails.

FORWARD MOTOR CO.,
Forward Wks., Summer Row, Birm'ham.

1418

Our illustration is of the Forward. Price 1/6.

F.R.S. ELECTRIC



Sidecar sets, complete, as above	132/-
Motor Cycle sets, with accumulator in box, for fitting to top tube	100/-
Lamps only, with handle-bar fittings	42/-

F.R.S. LAMPS, "Beam" Works, Pershore Street, BIRMINGHAM.

ROSCO CYLINDER BLACK.

PRESERVES YOUR CYLINDERS.

Tins, 6d. Withstands Heat. **Post Free, 8½d.**
Tins, 1/- **Post Free, 1/3½**

Sole Manufacturers:

OWEN BROS., HULL, Eng.

DEFENCE OF THE REALM ACT

Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

6h.p. A.J.S. Combination de Luxe, 1916, Lucas dynamo lighting set, with electric horn and inspection lamp, screen, spring seat-pillar, spare wheel, Binks carburetter, handle-bar watch, perfect order; £98, lowest.—46, Woodbank Crescent, Sheffield. [X5011

A.J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [4987

Alldays.

2½h.p. 1914 Allon, 2-speed model; price £15, bargain —Wauchope's, 9, Shoe Lane, London. [5724

ALLON, 2¾h.p., brand new, 2-stroke, never been on the road, and guaranteed; reduced price £32.—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [5572

Ariel.

CROW Bros., Guildford, Ariel agents.—New and overhauled second-hand models in stock. [5370

Bat.

FOR Sale, 8h.p. Bat-Jap, 1911, N.S.U. 2-speed, and sidecar; £23, or exchange later machine and cash —H. Druce, Apsley End, Hemel Hempstead, Herts. [5687

1915 Model 8h.p. Bat-Jap 3-speed Countershaft Combination, coachbuilt sidecar, very powerful, good condition; £57/10.—Box L6,339, c/o *The Motor Cycle.* (D) [5643

BAT-J.A.P., 6h.p., 2-speed, handle start, Bosch, B. and B., underslung coach sidecar, splendid condition and running order; £20, bargain.—29, St. Leonard's St., near Bow Bridge. [5693

Brough.

1916 T.T. Brough, 3½h.p., splendid order, only done 2,000, very fast, lamps, horn, speedometer, etc.; what offers?—Lt. Loyd, 1, Ovington Gardens, London. [5700

B.S.A.

B.S.A. and Sidecar; a bargain, £22/10.—Wilkins, Simpson and Co., 11, Hammersmith Road (opposite Olympia), London. [5665

1917 B.S.A., 4¼h.p., chain-cum-belt, semi T.T. bars, good condition; £55.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0552

1917 B.S.A. 4¼h.p. Big Single, 3-speed countershaft gear, free engine, clutch, and kick starter, practically as new, includes all accessories and tools; £57/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5709

B.S.A., 1917, 4¼h.p., new February, 1918, chain drive, lamps, new Model 2 sidecar, with hood and wind screen; sell or exchange for A.J.S. combination and cash difference.—Particulars, J. E. Poulson, Wheat Sheaf Hotel, Cheadle, Staffs. [X4982

B.S.A., 1914, 3½h.p., clutch model, kick starter, condition as new, just overhauled, new tyres and belt, etc., guaranteed sound order not used this last two years; 29 gns. for quick sale; wicker cane sidecar, complete, off same, 3 gns.; appointment.—Holvoet, 141, Goldhurst Terrace, Hampstead. [5625

Calthorpe.

1916 Calthorpe, 2-stroke, 2-speed, lamps and horn; £30.—Parker and Son, St. Ives, Hunts. [5632

2½h.p. Calthorpe, 2-stroke, 2-speed model, 1915 machine, but little used, including accessories; £22/10, bargain.—Wauchope's, 9, Shoe Lane, London. [5726

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [5677

MOTOR CYCLES FOR SALE.

Caithorpe.

CALTHORPE, 2-stroke, Enfield 2-speed, brand new: special bargain, £29.15; Dunlops.—Wilkins, Simpson and Co., 11, Hammersmith Rd. (opposite Olympia), London. [5668

CALTHORPE-J.A.P., brand new, Enfield 2-speed, Dunlops; special bargain, £34.—Wilkins, Simpson and Co., 11, Hammersmith Rd. (opposite Olympia) London. [5669

Clyno.

2½h.p. Clyno, smart 2-stroke machine, reliable and speedy; bargain at £22/10; any trial, and guaranteed.—Wauchope's, 9, Shoe Lane, London. [5710

6h.p. Clyno 1914 Combination, large roomy sidecar, child's seat in front, beautifully sprung, 3-speed gear, kick starter and clutch, nice turnout, and smart; £65; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5723

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester [4749

DOUGLAS 4h.p. 1914 Combination, as new, very easy starter; £65.—Clare, Ravensden, Beds. [5692

1913 Douglas, single speed, T.T., thoroughly overhauled, perfect; £18.—W. Jennings, Bozeat, Wellingborough. [5752

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat Yeovil. Tel.: 50. [5855

DOUGLAS, 1914, 2¾h.p., 2-speed, clutch, kick start, good order, just overhauled; 30 gns.—Thornwood, Cromwell Gardens, Marlow. [5615

DOUGLAS, late 1915, 3 speeds, splendid condition, not used last 10 months; bargain, £35.—Wilson, 65, West Sq., Farnborough, Hants. [X4987

DOUGLAS, late 1913, T.T., 2-speed model, fully equipped, several accessories, condition nearly equal to new; £32.—Albert E. Deans, Baldock. [5689

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

1912 2¾h.p. Douglas, 2-cyl., clutch, Bowden controls, 2 speeds, excellent condition, tyres good.—Carleton and Tulloch, 15a, Down St., Piccadilly, W. 'Phone: Mayfair 1037. [0948

DOUGLAS, 1914, T.T., enamelling and plating unscratched, speedometer, warning signal, 2in. exhaust pipe, gas and electric, perfect; £36; dinghy wanted.—25a, East Rd., Kingston-on-Thames. [5708

DOUGLAS 1915 4h.p. Combination, 3 speeds, kick start, all accessories, £60; 1914 2¾h.p. Douglas, all accessories, including speedometer, splendid condition, £35.—Maudes', 100, Gt. Portland St., London, W.1. [5736

DOUGLAS, 1914, 2¾h.p., 2-speed, just been thoroughly overhauled and re-enamelled, and special lightweight Watsonian sidecar, lamps, tools, etc.; would separate; £42.—F. Shurman, 77a, Exton St., Waterloo Rd., S.E. [5691

1916 2¾h.p. Douglas Model U, touring bars, footboards, 2-speed gear, Hutchinson tyres, Amac carburetter, Thomson-Bennett magneto, B170 saddle, few miles only, perfect condition; £52/10.—Robinson's Garage, Green St., Cambridge. [5647

1917 4h.p. Models A. and B. Douglas, 2¾h.p. Model W., also U. and V. 1916 specification, absolutely new; immediate delivery against Priority Permit for doctors, farmers, war and munition workers.—How and where to apply, full particulars, write Douglas Specialists, Robinson's Garage, Green St., Cambridge. [5646

Enfield.

ROYAL Enfield Lightweight, twin, 2-speed, nearly new tyres, best order.—P. Deery, Strabane. [X4904

2¼h.p. New Enfield, 2-stroke, 2-speed model, from stock; cash or exchange.—Wauchope's, 9, Shoe Lane, London. [5712

ENFIELD, 3h.p. 2-speed twin, £57/10; ditto special G.T. Model, £57/10; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

3h.p. Royal Enfield, 1915 model, 2-speed M.A.G. twin-cyl. engine, and all accessories; bargain at £32/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5713

1916 Enfield Combination, 6h.p., lamps, horn, hood, screen, speedometer, splendid condition; £80.—Flee and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0551

6h.p. Twin-cyl. 1914 Royal Enfield Combination, fitted with smart coachbuilt sidecar, including all accessories; price £55; guaranteed.—Wauchope's, 9, Shoe Lane, Fleet St., London. [5711

6h.p. Enfield Combination, 1917 model, fitted with large hood, Triple screen, 3 lamps, and horn, etc., all in new condition; exceptional bargain, 89 gns.; can be seen by appointment only.—A. W. Woodhams, 54, Treen Av., Barnes, S.W. [5728

FOR Sale, Royal Enfield motor cycle and coachbuilt sidecar, 6h.p. twin-cyl. J.A.P. engine, late 1916, self-starter, electric lighting, Hans Renold chains, mileage 2,500, perfect condition.—Price and full particulars, apply, Moody Bros., Blyth Motor Garage, Blyth, Northumberland. [0946

CASH—War loan or other securities taken.

CREDIT—Delivery at once, or when paid for.

EXCHANGE—Any reasonable proposition considered.

REMEMBER—This is the reliable house, and all machines sold by us are guaranteed in good running order. Trial allowed, satisfaction assured. Full details of any machine sent on application.

NOTE—Most machines in the list are complete with accessories, and in many cases speedometers, and other fittings.

LIGHTWEIGHTS (Two-stroke).

ALLDAYS ALLON, new, 2¾ h.p.	£38	14
ALLDAYS ALLON, new, 2¾ h.p., 2-speed, hand clutch	£48 /7	/6
ALLDAYS ALLON, 2¾ h.p., 1917, as new	£38	0
CLYNO, 1914	£19	0
COVENTRY EAGLE, new, 2½ h.p., 2-speed countershaft	£44	2
CONNAUGHT MINIATURE, new, 2½ h.p., 2-speed	£41 /6	6
CONNAUGHT, Standard, new, 2½ h.p., 2-sp.	£44	10
J.H., new, 2½ h.p., 2-speed countershaft	£35	14
METRO, Lady's, 2-speed countershaft	£36	10
NEW HUDSON, 2-speed, 2½ h.p.	£25	0
ROYAL RUBY, 1916, 2¾ h.p., as new	£22	10
SUN-V.T.S., new, 2½ h.p.	£30	10

LIGHTWEIGHTS (Four-stroke).

A.J.S., 1913-14, 2¾ h.p., 2-sp. c/shaft, clutch	£35	0
A.J.S., 1914, 3-speed, clutch, and kick-starter	£42	10
DOUGLAS, 2¾ h.p.	£16	0
DOUGLAS, lady's	£28	0
F.N., 2¼ h.p., 2-speed, clutch	£12	0
NEW IMPERIAL, new, 2-sp., clutch, k.-start.	£54 /5	6
NEW IMPERIAL, 1916, 2¾ h.p., 2-speed	£30	8
O.K.-JUNIOR, Mark IV., new, 2½ h.p., 2-sp., clutch	£43	0
O.K.-JUNIOR, 1914, 2½ h.p., 2-speed	£25	0

MEDIUM WEIGHTS.

ABINGDON, 1914, 3½ h.p.	£23	15
B.S.A., 1914, 4¼ h.p.	£31	0
B.S.A., 1913, clutch model, 3½ h.p.	£25	0
B.S.A., 1915, 4¼ h.p., with Sidecar	£57	10
BRADBURY, 3½ h.p.	£11	10
BROWN, 3½ h.p.	£14	5
BROUGH, 1916, 3-speed	£64	0
HUMBER, 1912, 3½ h.p., 2-speed	£19	10
JAMES, 4¼ h.p., 3-sp., electric, Canoelet S.C.	£75	0
NEW HUDSON, 1913, 3½ h.p., 3-speed	£29	10
PREMIER, 1914, 3-speed	£28	10
PREMIER, 1916, 3½ h.p., 3-speed countershaft, clutch, kick-starter, C.B. Sidecar	£62	0
PREMIER, 3½ h.p., 2-speed, clutch	£19	10
PREMIER, 1914, 3-sp., c/shaft, clutch, k.-st.	£42	10
PEUGEOT, 4 h.p., V-twin	£12	0
ROVER, 1913, 3½ h.p., 3-speed	£32	10
RUDGE, 1913, 3½ h.p., Multi F.E.	£25	0
RUDGE, 1913, 3½ h.p., 2-sp., c/shaft, clutch, sporting Sidecar	£34	4
RUDGE, 1912, 3½ h.p., N.S.U. gear	£21	0
SCOTT, 2-stroke, 1914, 3¾ h.p. 2-speed Scott coachbuilt Sidecar	£59	10
SUNBEAM, 3½ h.p., new, complete Comb.	—	
SUNBEAM, 1915, 3½ h.p., and Sidecar	£65	0
SWIFT, 1915-16, 3½ h.p., 3-sp., clutch, and kick-starter, with coachbuilt Sidecar	£46	0
SWIFT, 1914, 3½ h.p., 3-speed, and clutch	£35	0
TRIUMPH, 1913, 3½ h.p.	£28	10
TRIUMPH, 3½ h.p., and wicker Sidecar	£19	0
TRIUMPH, 1913, 3½ h.p., 3-sp., hub clutch, and coachbuilt Sidecar	£38	10

HEAVYWEIGHT COMBINATIONS.

A.J.S., 6 h.p., new (Sidecar extra)	£92	6
CLYNO, 1913-14, 5-6 h.p., 3-sp. countershaft, clutch, and kick-starter	£57	0
CLYNO, 1912, 5-6 h.p., with Tradesman's Box	£25	0
ENFIELD, 1916, 6 h.p., 2-speed	£85	0
ENFIELD, 1915, 6 h.p., 2-speed countershaft	£69	10
HARLEY-DAVIDSON, 1915, 7-9 h.p., 3 sp. countershaft	£65	0
HARLEY-DAVIDSON, 1915, 7-9 h.p., electric, disc wheels	£75	0
HAZLEWOOD, 1914, 5-6 h.p., 3-sp. countershaft, and kick-starter	£68	17
INDIAN, 1915, 7-9 h.p., 3-speed, kick-starter, and Millford Sidecar	£60	0
MATCHLESS, new, 8 h.p., War Model	£125	0
NEW COMET, new, 6-8 h.p., J.A.P., 3-speed, S.A. c/shaft, clutch, k-st. (Sidecar extra)	£97	10
RUDGE MULTI, 5-6 h.p.	£39	10
SUNBEAM, 1914, 6 h.p.	£75	0

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MOTOR CYCLES FOR SALE.

Excelsior.

1916 Excelsior, 2-stroke, not used since 1917; offer over £14 secures.—Turley, 32, High Rusthall, Kent. [5

Grandex.

1913 2¾h.p. Grandex-Precision, horn, carrier, li ing set, new Avon and Dunlop tyres and ta recently overhauled and enamelled, perfect condit £12.—107, Tylecroft Rd., Norbury, S.W. [5

Harley-Davidson.

1916 7-9h.p. Harley-Davidson Combination, pra cally new; 70 gns.; everything complete.—Mi 62, Hampstead Rd., N.W. [5

LATE 1916 Harley-Davidson, electric model, fi with 1917 Mills-Fulford coachbuilt sidecar; c to offer, or exchange smaller power.—Oram, Colin P The Hyde, Hendon, N.W.9. [5

HARLEY-DAVIDSON, 7-9h.p. (late 1915), sid (new 1917), combination not used last 12 mon garaged S.W. London; £55, or offer, quick sale.—Ch man, 4, Victoria Rd., Retford, Notts. [5

1916-17 Harley Combination, one of the best smartest on the road, would suit officer requi fast cycle, Bosch mag., disc wheels, only run 2, miles, in first-class condition; can be seen and tue 3, St. Luke's Mews, Westbourne Park, W.11. [5

Hobart.

1916½ Hobart, 2¾h.p., 2-stroke, 2-speed, perf £23.—51, Plymouth Rd., Abbeydale, Sheffie [X5

Indian.

INDIAN, 1916, 2-stroke, lightweight, 3 speeds, ch drive; £26.—Maudes', 100, Gt. Portland St., L don, W.1. [57

INDIAN, 1915, 5h.p., 3-speed, clutch, kick start speedometer, 2 lamps, 2 horns, disc wheels, t pedo sidecar, hood, screen, very sporty, spares; £50 Write, 16, Cecil Rd., Harlesden, London. [X49

INDIAN, 1914 (late), 7-9h.p., 2-speed, clutch, T bars, Bosch mag., engine perfect, new Dunlo Stewart horn, 2 lamp sets, all accessories; bargain, £ or exchange Douglas.—262, Blackhorse Lane, Waltha stow. [X49

1916 Indian, 7-9h.p., spring frame, electric equipped, 3-speed, clutch, and coach sidecar match, only had one season's use, mechanically perfe £65.—Bayliss, 239, Walsall Rd., Darlaston. Tel.: Wednesbury. [56

James.

4h.p. James Combination, 3-speed; £55.—Wauchope 9, Shoe Lane, London. [57

BARGAIN.—1915 James 3½h.p. twin, not done 3,00 just been overhauled, tyres good, all accessori handsome machine; £40, or nearest offer.—Box L6 32 c/o *The Motor Cycle.* [56

J.A.P.

1914 6-8h.p. J.A.P. Combination, lamps and horn, speed, kick starter, good condition; £38. offers.—Parker and Son, St. Ives, Hunts. [56

Levis.

1916 2¼h.p. Levis, splendid condition; £25.—Garra Victoria Rd., Market Drayton. [X49

LEVIS, 1915, single speed, perfect condition, Du lops, electric light; £18.—Liley, 30, Benson S Liverpool. [X50

LEVIS, 2½h.p., Model E., Enfield 2-speed, chain driv brand new, in stock; special bargain, £44.—W kins, Simpson and Co., 11, Hammersmith Rd. (opposi Olympia), London. [56

LEVIS, 1915, 2¼h.p., No. 1 Model, not used sin 1915, in excellent all-round condition, 2 lamp generator, spare belt and tube and tools; any examin tion; £22/10, or near offer.—Montgomery, 74, Lya hurst Rd., Peckham. [56

LEVIS, 2¼h.p., 1916, 2-speed, free engine, perfe throughout, kick starter, head lamp, generato rear lamp, tools, fully equipped, very economical, sple did climber; bargain, £27/10.—Mebes and Mebes, 154- Gt. Portland St., W.1. Tel.: 3426 Mayfair. [55

Matchless.

MATCHLESS Combination, 7h.p., coachbuilt sideca with hood, all accessories, splendid condition £55.—3, Avenue Rd., Wallington. [562

MATCHLESS.—Delivery from actual stock of M.A. and J.A.P. engined models; exchanges if desire —Maudes', 100, Gt. Portland St., London, W.1. [557

MATCHLESS Latest War Model Combination, com plete with detachable wheels, spare wheel and tyre £120.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exete [252

1918 Matchless Combination, W.O. Model, electri lights, spare wheel, absolutely as new; £115.— Flee and Co., 15-16, Bishopsgate Av., Camomile St. E.C.3. [049

MATCHLESS, 3½h.p., rear sprung, Bosch, Bink Brooks padded, good tyres, footboards, etc., jus overhauled; £15; any trial.—Murray, 48, Burchell Rd. Peckham, S.E.15. (D) [562

MATCHLESS 1914 3½h.p. Twin, 3-speed, K.S., com pletely overhauled, re-enamelled, replated, Bosch, B and B., Dunlops; £35; exchange higher power.—86 Townsend Rd., Southall. [563

MOTOR CYCLES FOR SALE.

Matchless.

7 .p. Matchless B8 Model, 1915, 3-speed countershaft, all chain drive transmission, fast combina- ti coachbuilt sporting sidecar, includes accessories; £7—Wauchope's, 9, Shoe Lane, London. [5715

8 p. 1918 War Model Matchless Combination, in condition as new, fitted with non-skid Palmers all w ls, spare wheel and tyre, detachable wheels, superior s e with back-rest, complete with lamps and warning s l; £115; guaranteed.—Wauchope's, 9, Shoe Lane, L lon. [5721

Minerva.

INERVA Combination, twin, 6h.p., countershaft, lighting set, Stewart speedometer, Bosch mag., c hbuilt sidecar, with dust cover, spares, in splendid r ing order; price £30.—Box L6,327, c/o *The Motor C e.* [5625

Motosacoche.

OTOSACOCHE, 2½h.p., De Lissa valves, spring forks, £15 10; 4h.p. combination, £20; magneto, £ write for appointment.—O.R., 337, Hoe St., Walthastow, E.17. [5614

New Hudson.

EW Hudson, 1916, 2¼h.p., 2-stroke, 2-speed, countershaft; £27; as new.—Williams, 36, Montpelier N.W.5. [5644

15 New Hudson, 4h.p., 3 speeds, clutch, kick start, practically new condition; price £37/10.—Gibbs, cett St., York. [X4841

.p. New Hudson, clutch model, 3-speed gear, J.A.P. engine, Bosch mag., perfect going order; £22, or r offer.—Pattullo, Higgs and Co., Lower Orpington. [5464

New Imperial.

ROW Bros., Guildford.—New Imperial, all models, new and second-hand, in stock. [5371

16 New Imperial-Jap, 2½h.p., 2-speed, free engine, excellent condition throughout; £26.—R. Croydouvler, Cadleigh, Ivybridge. [5622

EW Imperial-Jap, 8h.p., 3-speed War Model combination; 109 gns.; delivery from stock.—Exeter tor Cycle Co., Ltd., Bath Rd., Exeter. [3521

916 2¾h.p. 2-speed New Imperial-Jap, Stewart trip speedometer, Baby Klaxon horn, run 800 miles; 1915 Auto-Wheel, little used.—Box L6,200, c/o *Motor Cycle.* [5216

EW Imperial Motor Cycles, 2 speeds, clutch and kick starter and lady's models in stock for imdiate delivery; trade supplied; no permits required. . J Evans, 91 John Bright St., Birmingham. [5678

Norton.

ORTON Big 4, all-chain drive Military Model; £82. —Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter.

ORTON 3-speed Combination, chain-cum-belt, excellent condition; cost £110 1916, £65; lightweight o as part considered.—Wyatt, Heacham. [5702

½h.p. Norton, Brooklands T.T. Model, 1916 machine, fast and perfect, includes accessories; £59; aranteed.—Wauchope's, 9, Shoe Lane, London. [5725

ORTON 1918 4h.p. Combination, only done 400 miles, Lucas dynamo lighting set, Watford speedueter, mechanical horn, and tools; this machine is n h more economical and more powerful than any .p.; cost nearly £130 a few months back; £95 cures.—Hawley, Goodall St., Walsall. [X5053

[3524

N.S.U.

AVING Acquired the entire stock-in-trade of the N.S.U. Motor Co., Ltd., we can supply spares for actically all types of N.S.U. motor cycles. In ordering is important to submit old parts as patterns.—Eagles d Co., Acton Hill Works, Acton, W.3. [0739

O.K.

.K., 1915, 4-stroke, 2 speeds, new tyres, lamps, horn; £18.—Maudes', 100, Gt. Portland St., London, W.1. [5738

.K. Juniors are real joy-ride mounts.—For early delivery order now from Youngs, The Parade, Kilurn, N.W.6. [0944

P. and M.

912 P. and M., 3½h.p., 2-speed, kick starter, waterproof mag., good condition; £21.—Stocks, Thurlone, Sheffield. [X5055

Peugeot.

EUGEOT Combination, twin, 6h.p., 2 speeds, lighting set, speedometer, sidecar upholstered green; rice £20; would separate.—Box L6,328, c/o *The Motor ycle.* [5626

Precision.

5 Gns.—4¼h.p. Precision, Grado gear, variable, overhead valves, Bosch, Druid forks, new tyres nd belt, pan saddle, etc.—Miller, 62, Hampstead Rd., .W.1. [5555

Premier.

REMIER Lightweight, 1913, 2½h.p., free engine, h.b.c., new mag., good tyres, good order; £14, no ffers.—201, Camden Rd., N.W.1. [5697

½h.p. Premier, dismantled; all parts for sale; N.S.U. gear, Triumph cylinder and piston; cheap.—Bown, 2, Seymour Rd., Clayton, Manchester. [X5023

915 Premier and Sidecar, 3½h.p., 3-speed, countershaft, clutch, kick start, Dunlop tyres and belt, splendid running order; any trial given; £30.—Robert irkwood, Friths Farm, Stones Green, Harwich. [X5017

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1918 6 h.p. **A.J.S.** Combination, military model, storm apron, screen, lamps, horn, nearly new	£115 0
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1916 6 h.p. **ENFIELD** Combination, storm apron, lamps, horn, splendid condition	£76 0
1916 **A.J.S.**, 6 h.p., body only (coachbuilt)	£6 6

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A.K. Knee Grips	per pair	9/6
Polishing Cloths, "Chemico," 14¾in. × 14¾in.	each (post free)	6d.
Armoured Tool Cases (leather), 10in. × 3½in.		12/-
Ditto, ditto, 9½in. × 5in.		9/6
Ditto, ditto, 7in. × 3¾in.		9/-

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"Apollo"	each	4/-
"Splitdorf"	"	4/6
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Premier.

PREMIER, 3½h.p., clutch, 3-speed, kick starter, Dunlops nearly new, 3 lamps, horn, tools, and Canoelet coachbuilt sidecar, with screen; £25/15.—Wilkins, Simpson and Co., 11, Hammersmith Rd. (opposite Olympia), London. [5666

Raleigh.

3h.p. Raleigh, slope back frame, T.T., good tyres, mag., B. and B.; £10; exchange push bike; offers.—113, Blair St., Poplar, E.14. [5731

Rex.

6h.p. Rex Motor Bicycle, with sidecar fittings, for sale, property of an officer, new condition; only genuine applicants need apply.—Roy, Angel Hotel, Worcester. [X4986

REX T.T. Semi-racer, 3½h.p., 85×88, m.o.v., all straight tube extra strong frame, round steel tank, brass ends, Bosch, B. and B., recently had £4 overhaul and magneto remagnetised, painted grey; price £12/10, or near offer; seen mornings, or write Caretaker, 314, Gray's Inn Rd., London, W.C. [5636

Rover.

1914 3½h.p. 3-speed Rover, lamps and horn; £38.—Parker and Son, St. Ives, Hunts. [5633

ROVER 3½h.p. Motor Cycle, Sturmey J.S. 3-speed gear, just as new, unscratched; £35/10; send for photograph.—20, Forrest St., Latchford. [5517

ROVER 1915 3½h.p. Combination, 3 speeds, genuine Rover sidecar, with brake, all accessories, excellent condition; £52.—Maudes', 100, Gt. Portland St., London, W.1. [5739

ROVER Motor Cycles, 3½h.p. and 5-6h.p. models, in stock for immediate delivery, both solo and sidecar outfits; trade supplied; no permits required.—P J. Evans, 91, John Bright St., Birmingham. [5676

Rudge.

RUDGE, 3½h.p., special model, all accessories, Jones speedometer, condition like new; £24.—Maudes', 100, Gt. Portland St., London, W.1. [5740

BARGAIN.—1914 T.T. 3½h.p. Rudge Multi, clutch, do 60 m.p.h., condition perfect; owner joining up; £23.—C. Newton, 41, Hoghton St., Southport. [X5034

Scott.

1912 Scott Combination, 3¾h.p., perfect condition, recently overhauled, good supply spares, lamps, etc.; £32.—Orman, Victoria Rd., Netley Abbey, Hants. [X5052

SCOTT, 2-speed, kick start, Binks, and Myers aluminium sidecar, in excellent condition and running order, tyres very good; £45.—Apply, Crook, 49, Priest Lane, Ripon, Yorks. [X5025

Singer.

3½h.p. 1913 3-speed Singer, new cylinder, complete, sound order; £25.—Rev. Jones, Stewart Rd., Oswestry. [5696

1914 Singer, 2¾h.p., 2 speeds, clutch, in excellent condition; price £27/10.—Gibbs, Fawcett St., York. 'Phone: 400. [X4842

Sunbeam.

SUNBEAM Combination, 6h.p., late 1915, 3-speed, kick starter, Lucas dynamo lighting, fully equipped, spares, perfect condition; £90.—Pierreville, Addlestone Hill, Addlestone. [5674

3½h.p. Sunbeam Coachbuilt Combination, 1914 model, beautifully kept, includes Lucas's best accessories, tools, storm apron, smart and serviceable; £75; guaranteed.—Wauchope's, 9, Shoe Lane, Fleet St., London. [5719

Triumph.

TRIUMPH, 4h.p., 2 speeds, free engine, coachbuilt sidecar; £30.—H., Bryn Menai, Sutton. [X5041

3½h.p. Triumph, N.S.U. gear, very powerful, good condition; £15, or exchange for lightweight, cash adjustment.—107, The Grove, Hammersmith, W. [5681

TRIUMPH Coachbuilt Combination, 3-speed, clutch, head and rear lamps, speedometer, horn, tools, spares, etc., beautiful turnout; bargain, £30, offers; appointment.—25, Stratford Rd., Acton. [5747

TRIUMPH, late 1914, semi T.T., 3-speed and clutch, complete with lamps, specially tuned, very fast, appearance and condition super-excellent; £37/10; seen evenings or week-ends by appointment. 'Phone: 1578 Chiswick.—46, Hillcrest Rd., Acton. [5745

TRIUMPH, 1913, 3½h.p., clutch model, Bosch mag., Triumph carburetter, £22; Triumph, 1909, Bosch mag., £17; Triumph, 1913 clutch model, just been overhauled, requires reassembling, £20.—Maudes', 100, Gt. Portland St., London, W.1. [5741

1915 Triumph, with 1917 torpedo shaped sidecar, Sturmey-Archer 3-speed hub gear, engine rebushed, enamel and plating like new, lamps, horn, tools, etc., all in first-class condition; £50, or near offer.—Holton, Dudley House, Park Rd., Wembley, Middlesex. [5661

Velocette.

1914 Velocette, in good condition, but minus 2-speed, good Dunlops, all chain drive; £10.—Steele, Church St., Silverdale, Staffs. [X5009

Williamson

1914 Williamson Water-cooled 8-10h.p. Combination, in first-class condition, lamp, hood, screen, and tools; £70.—Mepsted, King's Head, South Ockenden, Essex. [5680

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MOTOR CYCLES FOR SALE.

Williamson.

NEW Williamson 8h.p. w.c. Latest 1914 Combination, used few times, screen, speedometer, all Lucas lamps, horn, mirror, luxurious turnout; £80.—353, King St., Hammersmith. [X5028

Yale.

7-9h.p. Yale Combination, 21 gn. N.S.C. sidecar, powerful outfit; any trial; £70, or near offer.—J. Gedling, 101, Auckland Terrace, Shildon, Co. Durham. [X5024

Zenith.

ZENITH, 1917, 4-5h.p., Model C., lamps, horn, not done 1,000 miles; £52.—100, Gt. Portland St., London, W.1. [5742

ZENITH-GRADUA Combination, 8h.p. J.A.P. engine, new 1916, run about 500 miles, handle start; £55.—H. Oakley, High St., Epping. [5707

1914 Zenith-Gradua, J.A.P. 5h.p., for sale, with Gloria sidecar, complete with 3 lamps; price £35.—Beilby, 14, Foss Islands Rd., York. [X4978

1917 3h.p. Zenith, countershaft model, kick starter, and free engine, complete with all accessories, twin-cyl. J.A.P. engine, very fast, in good sound condition; £57/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5722

ZENITH 1916½ 8h.p. Combination, complete with Cowey speedometer, lamps, horn, tools, and many spares, ridden under 4,000 miles, in perfect condition; first cheque for £68 secures, no offers.—Hawley, Goodall St., Walsall. [X5054

ZENITH 1916 Countershaft Model, kick starter, and free engine, twin-cyl. J.A.P. engine, fitted with coachbuilt Swan sidecar, fascinating combination, in sound condition; £60; guaranteed.—Wauchope's, 9, Shoe Lane, Fleet St., London. [5720

Miscellaneous.

WANDSWORTH Motor Exchange.—Great bargains in real good modern motor cycles.—Below.

WANDSWORTH.—Easy terms only one quarter down, balance 12 monthly payments.—Below.

WANDSWORTH.—1914 Red Indian, 7-9h.p., mag., 2 speeds, nearly new; 42 gns.—Below.

WANDSWORTH.—1915 Red Indian, 5h.p., mag., 3 speeds, little beauty; 42 gns.—Below.

WANDSWORTH.—1914 Red Indian, 7-9h.p., mag., 2 speeds; great bargain, 39 gns.—Below.

WANDSWORTH.—1915 Red Indian, 5h.p., mag., 3 speeds, nearly new; offers.—Below.

WANDSWORTH.—Rudge Multi, 3½h.p., mag., lamps, ridden only few miles; 48 gns.—Below.

WANDSWORTH.—Rudge Multi coachbuilt combination, 3½h.p., mag., very smart; 55 gns.—Below.

WANDSWORTH.—Rudge, with coachbuilt sidecar, 3½ h.p., mag., 2 speeds; gift, 29 gns.—Below.

WANDSWORTH.—1914 Ariel, 3½h.p., mag., 3 speeds, clutch, nice condition; 26 gns.—Below.

WANDSWORTH.—1914 New Hudson coachbuilt combination, 4h.p., mag., 3 speeds; 32 gns.—Below.

WANDSWORTH.—Rover 1915 coach-built combination, 3½h.p., mag., 3 speeds, lamps; 42 gns.—Below.

WANDSWORTH.—Alldays Allon, 1915-17, 2¾h.p. mag., 2 speeds; first cheque 26 gns.—Below.

WANDSWORTH.—Lea-Francis 1914 combination, 4-5h.p. J.A.P., mag., 2 speeds; offers.—Below.

WANDSWORTH. — Edmund combination, twin M.A.G., mag., Enfield gear, lamps; 46 gns.—Below.

WANDSWORTH.—B.S.A., 3½h.p., mag., F.E. clutch, splendid order; only 18 gns.—Below.

WANDSWORTH.—N.S.U. 5h.p. twin, mag., 2 speeds, lamps, runs well; 16 gns.—Below.

WANDSWORTH.Douglas, 2¾h.p. twin, mag., only wants seeing; 15 gns.—Below.

WANDSWORTH.—Motor cycle, 3-3½h.p. Kelecom engine, Bosch mag.; gift, £7/15.—Below.

WANDSWORTH.—Exchanges entertained. — Wandsworth Motor Exchange, Ebner St., Wandsworth (Town Station). 'Phone: Battersea 327. [5688

SEVERAL Late Model Lightweights and Combinations in stock, fully equipped, at reasonable prices. Write us your requirements.—Mebes and Mebes, 154-6, Gt. Portland St., W.1. Tel.: 3426 Mayfair. [5582

4h.p. A.S.L.-J.A.P., £18/10; 1913 3½h.p. 3-speed Bradbury, £29/10; 1912-13 3-speed Bradbury and coach sidecar, £32/10; 1914 6h.p. 3-speed Bradbury and sidecar, £55; 1913 2-speed chain drive Diamond, £25/10; 1915 2-speed Douglas, £39/10; 1914 2-speed Douglas, £34/10; 1916 2-speed Enfield combination, £82/10; 1915 Enfield combination, £72/10; 1916 Harley-Davidson and Harley sidecar, £82/10; 4h.p. 2-speed Indian, £22/10; 7-9h.p., free engine Indian, £23/10; 1914 7-9h.p. 2-speed Indian and sidecar, £45; 3½h.p., magneto Auto-Motor cycle, £7/10; 3½h.p. magneto Humber, £13/10; 3h.p. N.S.U., 2 speeds, £11/10; 3½ h.p. 2-speed N.S.U., and new coachbuilt sidecar, £22/10; 5-6h.p. Rudge Multi and sidecar, £45; 1915 2-speed 2-stroke Radco, £21/10; 6h.p. twin Rex, £14/10; 1913 6h.p. 2-speed Rex Sidette, £35/10; 1911 3½h.p. 3-speed Triumph, £26/10; 2-speed Velocette, £25; 1915 8h.p. Zenith-Gradua, £55/10.—Motor Exchange, 68, Horton St., Halifax. [5648

THIS WEEK'S OFFER.

T.T. ROVER, latest model, Philipson pulley, absolutely new, engine never started up since machine left works. Makers' cash price £67 10s. Our special price **55** gns. only. Great opportunity to save £10.

Also the following in stock:

NEW MACHINES.

NEW HUDSON and Sidecar, 3½-4 h.p., with lamps and horn	£91/13/8
LEVIS POPULAR, 2-stroke	£32 0
LEVIS, 2¼ h.p., 2-sp., 2-stroke	£47 10
LEVIS, 2¼ h.p., 2-stroke	35 gns.
NEW IMPERIAL-J.A.P., 2¼ h.p., 2-speed	44 gns.
ROVER, W.O., 5-6 h.p. J.A.P., 3-speed, clutch, and Sidecar	£124 6
ROVER, W.O., 5-6 h.p. J.A.P., 3-speed, clutch	£97 10
ROVER, 3-speed, clutch	£80 0
ROVER, T.T., Philipson	£67 10
ROVER, 3-speed, not done 2,000 miles	50 gns.

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84, Broad Street,

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Biggest Light Car and Motor Cycle Dealer in the South.

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NEW MACHINES IN STOCK.

1918 **MATCHLESS** Combination, 8 h.p., M.A.G., spare wheel	£125 0
1918 **A.J.S.** Combination, 6 h.p., W.O. model, spare wheel, screen, storm apron	£120 0

SECOND-HAND COMBINATIONS.

1918 **MATCHLESS** Combination, W.O. model, J.A.P. engine, electric lights, spare wheel	£120 0
1917 **HARLEY-DAVIDSON** Combination, magneto model, lamps, horn	£115 0
1916 **SUNBEAM** Combination, 8 h.p., M.A.G., lamps, horn, etc.	£105 0
1915 **SUNBEAM** Combination, 6 h.p., Lucas dynamo lighting, fully equipped, spare wheel	£110 0
1916 **ENFIELD** Combination, 6 h.p., lamps, horn, hood, screen	£85 0
1916 **NORTON** Big 4 and sporting Sidecar, lamps, horn	£75 0
1916 **B.S.A.** and Sidecar, 4¼ h.p., lamps, horn	£65 0
1914-15 **MATCHLESS** Combination, 8 h.p., M.A.G., lamps, horn	£65 0
1913 **ENFIELD** Combination, 6 h.p., lamps, horn	£45 0

1917 **NEW IMPERIAL,** 2¼ h.p., 2-speed, T.T. bars	£30 0
1914 **DOUGLAS,** 2¾ h.p., 2-speed, T.T. bars	£35 0
1912 **TRIUMPH,** 3½ h.p., clutch model, just overhauled	£20 0

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15-16, Bishopsgate Avenue,
—Camomile Street, E.C.3.—
'Grams: "Elcemocyca, London."
'Phone: Avenue 5548.

MOTOR CYCLES FOR SALE.

Miscellaneous.

CHATER-LEA and Douglas for sale, 8h.p. combi tion, beautiful condition, and 2¾h.p. Douglas.—27 High Rd., Chiswick. [56

JOINED Up.—But only three motor cycles left (lo of cars): 1914-15 4h.p. New Hudson 3-speed co bination, £25 cash; no offers.—Douglas S. Cox, Mot Clearing Expert, 6c, Lansdowne Hill, West Norwo S.E. (See Cars.) [55

MOTOR Agents.—I have in stock for immediate d livery one hundred new motor cycles, Rover, N Imperial, Calthorpe, James, Connaught, and Hockle No permits required. Let me quote you.—P. J. Eva 87, 89, and 91, John Bright St., Birmingham. [56

BARGAINS.—7-9h.p. Harley-Davidson combinatio £59/15; 1916 Harley-Davidson 7-9h.p. combin tion, electrically equipped, £80/15; 1915 Harley-Davi son combination, £69/15; 1915 4¼h.p. B.S.A., wi B.S.A. sidecar, £56/15; 1914 4¼h.p. B.S.A. combin tion, £45/10; 1914 6h.p. Zenith, countershaft gea £33/10; 3½h.p. Rudge, 1912, Grado gear, £18/15; 4h. Bradbury, 1911, Grado gear, coach sidecar, £21/1 6h.p. Rex, 1909, £12/15; 3½h.p. Rex, 1910, £12/1 3½h.p. Humber, 1911, 2 speeds, £18/15; 6h.p. Rudg 1913, Multi gear, £29/15; 2½h.p. T.D.C., 1914, £12/1 2¾h.p. T.D.C., 1915, £13/15; 2¾h.p. T.D.C, 191 £15/10; 1910 Douglas, free engine, £14/15; 3hp. Mi erva, mag., £6/15; 3½h.p. Excelsior, £3/19; 191 Crouch car, detachable wheels, £65. Send for detail list.—Booths Motories, Portland Place, Halifax. 'Phone 1062. [565

BODIES.

CLEARANCE Lines.—Large stock cane sidecar bodi offered, stock soiled only; low prices.—Willo brook Co., Leicester. [090

PHŒNIX Coach, wicker, cane bodies, single and ta dem models in all colours; largest selection in th trade; several stock soiled to clear; repairs, repaintin and re-upholstering a speciality; actual manufacture —Phœnix Sidecars, 736, Holloway Rd., London. [233

SIDECAR Body Designs for the trade only. Wor ing, coloured, pencil, or line drawings of origin designs, also working drawings full sized or to scale.—Cooper's Vehicle Journal, Ltd., established designers t the coach trade for over 80 years Consult us when de signing new ideas.—20, Tudor St., London, E.C.4. [081

SIDECAR ATTACHMENTS.

BASTONES for Sidecars and Bodies at low prices.—228, Pentonville Rd., King's Cross, London, N.1 [560

THE Willowbrook Co., Leicester, solicit your enquirie for sidecars of all descriptions. Write for illus trated catalogue. [071

NEW Underslung Chassis, latest model, with all fit tings, £5/15; new lightweight chassis, £3/5; can sidecar, complete, 35/-.—Booths Motories, Halifax. [5657

PHŒNIX Special Sidecar Chassis, for Harley-David son, 28in. type, £6/5; new sidecar wheels, 16/6 mudguards, with stays, 11/6; springs, 7/6 pair.—Booth Motories, Halifax. [565

PHŒNIX Sidecars, new and second-hand; also severa new stock soiled to clear; 100 complete sidecar always in stock; list free.—Phœnix Sidecars, 736, Holloway Rd., London. [2333

COACHBUILT Roomy Sidecar, for spring frame machine, wide mudguard, 700×80 Dunlop car tyre, underslung chassis, suit twin machine, condition new, used very little; £12.—A. Holland, Clarendon St., Coventry. [X5065

HOODS, WIND SCREENS, ETC.

PHŒNIX Manufacture Hoods from 35/-, screens 19/6. Immediate deliveries; special list.—Phœnix, 736, Holloway Rd., N. [2335

WIND Screens.—The Standard, 27/6; folding top, 32/6; double side wing screen, 45/-; the Fitall, 28/6; the fixed, 19/6; the Orto, 35/-, 55/-, and 60/-; Bluemels, 42/-; the Walbro, 36/-; fawn waterproof hoods, with strong wood frames and plated fittings, 37/6, 42/6, and 57/6.—Juno Showrooms, 248, Bishopsgate London. [2851

RUNABOUTS AND CYCLE CARS.

MORGAN, 1917 Grand Prix, water-cooled, hood, screen, lamps, etc., guaranteed as new; £140.—Below.

MORGAN, 1917 Grand Prix, dark green, hood, screen, disc wheels, heavy tyres, guaranteed as new; £135.—Below.

MORGAN, 1917 De Luxe Model, water-cooled, extra wide body, speedometer, disc wheels, hood, screen, lamps; £130.—Below.

MORGAN, 1915 Grand Prix, just being repainted, disc wheels, screen, speedometer; £105.—Mandes', 100, Gt. Portland St., London, W.1. Tel.: 652 Mayfair. [5744

8h.p. Morgan, hood, screen, special upholstered body, lamps, spare cover and tube; £72/10.—Motor Exchange, Horton St., Halifax. [5650

1914 Sporting Morgan, hood, screen, clock, speedometer, lamps, etc.; £78/10, or close offer.—Holdsworth, 22, Clare Rd., Halifax. [5649

8h.p. 1917 Morgan, M.A.G. engine, sporting model, fully equipped, hood and screen, complete with tools, and condition like new; 100 gns.—Wauchope's, 9, Shoe Lane, London. [5716

RUNABOUTS AND CYCLE CARS.

.4 8-9h.p. Air-cooled Humberette, new Avon tyres and Dunlop tubes, hood, screen, lighting set, ometer, etc., perfect condition; £55.—107, Tyle- Rd., Norbury, S.W. [5754

RGAN Runabout, 1915, J.A.P. engine, Bosch mag., speedometer, electric lighting, in first-class ; £85; would take good combination part.—Webster, egent Grove, Leamington. [X5040

RGAN, 1917 after-war model, air-cooled, 10h.p., lamps, disc wheels, horn, spring cushioned, door, air appliance, tools, extra inner tube, not run miles, 700×80mm. tyres; £150.—R. Fish, Lyniard, ord Rd., Bolton. [X5043

CARS FOR SALE.

IMLER, Silent Knight, 15h.p., 5-seater open touring, C.A.V. dynamo lighting; bargain, £180.—Below.

ARNE, 1913, 9h.p., 3 speeds, shop-soiled; only £45.—Maudes', 100, Gt. Portland St., London, W.1. [5743

14 Perry, 2-seater, hood, screen, lamps, etc., £125; 1915 2-seater Calthorpe, £185.—Motor Exchange, on St., Halifax. [5651

h.p. Swift, 2 or 3-seater small car, 1912 model, prime condition, Stepney wheel, hood, screen, and all sories; £85.—Wauchope's, 9, Shoe Lane, London. [5717

MBERETTE, 8h.p., air-cooled, Smith's carburetter, Bosch mag., Stepney wheel, acetylene lamps, ools and accessories, in first-rate condition; accept —C. Haies, Derby Rd., Ashbourne. [5683

ST Bargain of the Year.—1914-15 8-9h.p. Humberette, streamline body, domed mudguards, water- d, screen, one-man hood, tools, etc., unused two , perfect, good hill-climber, fast, economical; worth , accept £80 to clear; expert examination welcomed. n Marche, Chesterfield. [X5018

Khaki. And they say I look awfully well in it! But I still have some bargains left for absolute ance. Call over and see them, and if I am not Manager Inman will give you every attention. incidentally you can probably buy cheaper from than you would from me.

ADE One. Like me.—Late model Autocarrier 3-wheel parcel car, Sankey wheels, watertight mag., t 1914, worth £65, bargain, £25; Scott, Douglas, New Hudson motor cycles, £25 each; 15h.p. Tal- platform lorry, 4-speed gate, dual, pulls well, £35; 0h.p. N.A.G. ton van, Bosch, S.U. carburetter, gate, t roomy body, £35; 25-cwt. F.I.A.T. van, solids nd, Bosch, Claudel, £40.

SO Left.—14-16h.p. Ballot 4-seater, low flush-sided body, smart, pulls splendidly, £40; 20-30h.p. ton Humber 1-ton van, Zenith, gate, £45; 15h.p. Studebaker, 4-seater, monobloc, gate, dual, smart, ; 18-22h.p. Bedford-Buick light lorry, gate, dual, tyres, £50; 15.9h.p. R.C.H., 4-seater, monobloc, osed valves, Bosch, Zenith, smart car, runs well, ; 20h.p. 6-cyl. Standard chassis, late model, Claudel, ; 12-15h.p. Hupmobile, sporting 4-seater, £75; .p. live axle Daimler chassis, new tyres, Zenith, ; 15h.p. racing car, actual Brooklands winner, 70 .h., £75.

EFT, Right.—Good little Ford van, extra roomy body, separate watertight mag., runs nicely, £75; 6 Trumbull light car, streamline 2-seater, £80; 15.9 Gregoire chassis, gate, Zenith, raked steering, soap-sit-upon included (don't mention it), £85; Berliet n chassis, 12ft. wheelbase, twin solids, wants a little g up, £85; specially smart little Perry light car, chable wheels, 40 m.p.g., runs splendidly, £100; .p. 1914 Lagonda coupe, streamline, detachable els, 4-cyl. monobloc, worm, smart, £120; 11.9h.p. 7 Argo, sporting streamline 4-seater, equal new, l. monobloc, dynamo lighting, electric self-starter, tric blue, electric price, £125.

ARTICULARLY Right.—1914 20-30h.p. Studebaker six chassis, 6-cyl. monobloc engine, dynamo set, tric starter, detachables, exceptional condition, worth ble, £150; 11-18h.p. 1914-15 Brennabor streamline ater, detachable wheels, monobloc, seat starter, 35 g., runs beautifully, worth double, £150; extra cial Ford torpedo ¾ landaulet, luxurious Rolls-yce 7-seater body, round back, curved roof, pointed iator, bargain, £150; 12h.p. Siddeley-Deasy torpedo, eater, worm drive, enclosed valves, detachable wheels, 50; 20h.p. Rolls-Royce 1-ton platform lorry, 4-speed e, detachable rims, runs beautifully, £185; 11.9h.p. -15h.p.) 1914-15 Calthorpe, streamline 4-seater, 12 t Rotax dynamo lighting set, detachable wheels, high iator, particularly smart, £225; 3½-ton De Dion ssis, about 1914, latest round radiator type, 100×) enclosed valve engine, worm drive, steel wheels, rth double, £385.

OUGLAS S. COX, The Motor Clearing Expert, 6c, Lansdowne Hill, West Norwood, S.E., has all the ove actually on view. Please call. Hours 9 to 6 ekdays. No business Sundays.

OTE.—As I shall be busy for a few weeks winning the war, Mr. Harold Beasley, late of Mesopotamia, works manager, will show you every attention, while . Seymour Inman will attend to correspondence. [5543

VE have the following cars for sale for cash, extended payments, or your motor cycle in exange; Enfield, Alldays, R.M.C., Bayard, Humberette, ostmann.—Full particulars on application.—Service ., 292, High Holborn, London. [X4739

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In the "science" of their design and construction lies the secret.

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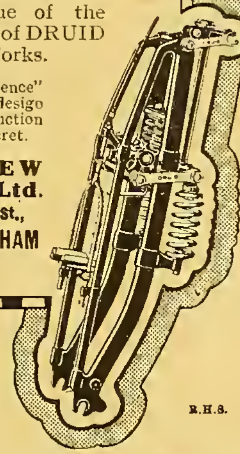

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20h.p. 4-cyl. Motor Car Engine, £15; magneto, £5—77, Acre Lane, S.W.2. [5750

NEW 3½h.p. A.B.C. Engine, opposed cylinders, includes mag. and carburetter; £35.—Wauchope's, 9, Shoe Lane, London. [5718

3h.p. Triumph, £3/10; 3h.p. Triumph, with carburetter and magneto, £7/15; all good order.—Motor Exchange, Horton St., Halifax. [5654

3½h.p. Fafnir, Bosch, B. and B., Grado gear, just overhauled; worth £9; what offers?—H. Fitch, 41, Boleyn Rd., Forest Gate. [5629

IGNITION APPLIANCES.

BOSCH Ignition Spare Parts, type DR4, new, with case complete.—Offers to Grady, 106, Rainham Rd., Chatham. [X5009

BOSCH Magneto, single, £3/19/6; Bosch twin, £4/15; new magneto for Douglas, £3/19/6; 2 volt 40 amp., 15/-; plain coil, 5/-; trembler coil, 7/6.—Motor Exchange, Horton St., Halifax. [5655

TWO U.H. Magnetos for horizontally opposed twin engines, Model K.A.2, used only for experiments also one B. and B., and one Senspray carburetter, to fit ⅞in. inlet pipe; all practically as new; what offers for the lot or part?—Every-Clayton, Hanley Swan, Worcester. [5641

MAGNETO Repairs of every description. We are late from the Bosch works, and give same guarantee at lowest possible prices. We have a large stock of single and twin magnetos of all makes, guaranteed, and sent on approval.—The Magneto Repairing and Winding Co., 158, Seymour St., Euston Rd., London, N.W.1 'Phone: Museum 1158. [4290

TYRES.

THE Economic Tyre Co.—Special clearance lines, carriage paid; approval against remittance.

ECONOMIC.—26×2¼ Kempshall, anti-skid, 17/6; selected covers, 21/-, listed 42/6; Kempshall non-skid, 27/6; selected 32/6, listed 53/4.

ECONOMIC.—650×65 3-rib Clincher Dreadnoughts, 40/-, listed 55/-; Kempshall anti-skid, 30/-, listed 57/9.

ECONOMIC.—28×3 Kempshall, anti-skid, 30/-, listed 69/3; Avon 3-rib, 39/6; A Won, 42/6.

ECONOMIC.—24×2¼ De Luxe, 30/-, listed 39/6, for 2-strokes; 26×2½×2¼, 35/-, listed 46/3; 26×2½, 32/6, listed 44/6.

ECONOMIC.—26×2½×2¼ tubes, for 2¼ rims, 7/6, listed 11/6; 26×2½, 6/6; 650×65, 8/6; belts from 9d. per foot.

ECONOMIC Tyre Co., 137a, Lewisham High Rd., New Cross, S.E.14. 'Phone: New Cross 1393. [5462

TYRES.—See Bancroftian Advertisement under Miscellaneous. Stelastic, Pedley, Kempshall, Hutchinson; extraordinary prices. [0845

ROM Combination Cover, 12/-; Max ditto, not used, cost 54/-, sacrifice 30/-; two butt tubes, 4/- each; all 26×2¼.—65, Linden Av., Thornton Heath. [5635

BASTONES.—Special clearance lines. Michelin heavy Trident covers, B.E., 26×2¼, 19/6; ditto, W.E., 17/6; Michelin, light, B.E., 26×2 8/6, 26×2½ 11/-; tubes, 26×2 4/9, 26×2¼ 5/3, 26×2½ 5/9; all sizes covers and tubes in stock.—228, Pentonville Rd., King's Cross, London, N.1. [5605

ELITE Rubber Company, Ltd.—We have the following special clearance lines in motor cycle covers, tubes, belts, etc. These goods are quite new. Any article sent on 7 days' approval against remittance. A 3/- outfit sent free of charge to all purchasers of covers and tubes, as advertised, on orders exceeding £1.

ELITE.—26×2¼ Avon Sunstone, 35/-, list 52/6; tricar 27/6, list 40/-; Stonehenge, 21/-, list 29/6.

ELITE.—26×2½ Avon tricar, 30/-, list 43/-; Stonehenge, 22/6, list 32/-.

ELITE.—650×65 Avon 3-ribbed, heavy, 33/-, list 48/-; extra heavy, 38/6, list 56/-

ELITE.—26×2¼ Kempshall heavy anti-skid, 19/6, list 37/6; 28×3, 27/6, list 57/6.

ELITE.—26×2½ Kempshall heavy non-skid, 45/-, list 58/6; 26×3, for 650, 42/6; list 78/-; 28×2½, 37/6, list 60/-.

ELITE.—26×2⅝ Pedley, extra heavy, 3-ribbed; 28/6, list 44/-.

ELITE.—26×2½×2¼ Midland, extra heavy ribbed and studded; 22/-, list 35/6.

ELITE.—Best quality inner tubes, 26×2 5/-, 26×2¼ 5/9, 26×2½ 6/6, 26×3 6/6, 28×2½ 7/6, 28×3 10/6; butted 1/6 extra.

ELITE.—Continental belts, 8ft. 6in.×1in., 10/- each; 7ft. 6in.×⅞in., 7/6 each

ELITE.—Best English make belts cannot advertise name, 6ft.×1in. 1/3 ft., suitable for all countershaft gear machines; also supplied as 2-piece belts, any length, 7ft. lengths of ¾in., at 11d. ft.

ELITE.—Retreading, extra heavy 17/6, heavy 15/-, medium 12/6.

ELITE Rubber Co., Ltd., Head Office 321-323, High Rd., Streatham, S.W. 'Phone: Streatham 1467. Also at 266, Vauxhall Bridge Rd., Victoria, S.W.1 (one minute from Victoria Station). 'Phone: Victoria 6553.—Please address all communications to Head Office, Streatham. [0933

TYRES.

GOODYEAR Covers, brand new, unsoiled, not clearance goods, but brand new all-weather tread, 650×65, list price £3/8, our price 30/-; also 700×80, listed at £3/19/6, our price 35/-; carriage paid on 12 covers.—Percy and Co., 337, Euston Rd., London. 1,000 covers in stock: special prices for quantities. [0738

TYRES by Best Makers; nearly half present prices.—Rubber studded, 26×2½, heavy, 28/6; 28×2½, heavy, 29/6; 28×3, heavy, 33/6; 26×2½ sidecar cover, 16/6; Kempshall heavy anti-skids, 26×2¼, 18/6 each; Continental heavy, 26×2½, 25/-; ditto sidecar tyres, 17/6; Goodrich 26×2¼in. rubber studded (clearance), 24/9 each.—Service Co., 292, High Holborn, London, W.C.1. [5757

PATENT AGENTS.

CONSULTING Patent Agency, 253, Gray's Inn Rd., London.—Free advice. Inclusive charges. [6427

INVENTORS' Advice and Handbook Free.—King's Patent Agency, Ltd., 186, Queen Victoria St., London. [5818

TANKS.

TANKS.—Tanks any shape to order, repaired or enamelled; disc for motor wheels; general sheet metal work; lists free.—Attwoods, 86, Rosebery Av., E.C. Tel.: Central 12445. [5523

SITUATIONS VACANT.

CYCLE Business in urgent need of a smart lad to manage it, able to do cycle repairs and buy and sell stock.—Apply, Box L6,321, c/o *The Motor Cycle.* [5606

WANTED, an experienced motor cycle draughtsman, well up on high-class work; a first-class permanent position with good prospects is open to a clever, earnest man.—Apply, Mr. C. Binks, Phœnix Works, Eccles. [X9835

INSURANCE.

FOR Insurance of all kinds (specially motor), apply, Ernest J. Bass, Insurance Broker, Bishops Stortford. [0693

DREADNOUGHT Motor Cycle Policies at Lloyd's. Low premiums by monthly payments. Before insuring elsewhere write for prospectus issued solely by Roys, Ltd., 199, Piccadilly, London. Tels.: Regent 5878-9. [7734

FINANCIAL.

CAPITAL Required, or partner for motor cycle business.—Box L6,347, c/o *The Motor Cycle.* [5751

A. WANTED.

DOUGLAS, Harley-Davidson, A.J.S., Enfield, Sunbeam, B.S.A., and Morgans purchased for spot cash, not earlier than 1915.—Maudes', 100, Gt. Portland St., London, W.1. [4254

WANTED, a motor bicycle.—Shrublands, Kempsey. [5624

WANTED, late model Henderson.—L., 56, Eton Av., N.W.3. [5758

LIGHTWEIGHT Sidecar, for 2¾h.p. Douglas.—Dr. Hancock, Bentley, Hants. [5706

DOUGLAS, 2-speed, 1914, 2¾h.p.; London district.—Box L6,346, c/o *The Motor Cycle.* [5749

WANTED, combination of recent date.—Particulars to 5, Park Av., Palmer's Green, N.13. [X5050

100 Motor Cycles Wanted, spot cash paid; bring or send, Palmer's Garage, Tooting. [0917

PISTON or cylinder and piston wanted, for 3½h.p. Premier.—Harper, Berkhamsted, Herts. [X4989

WANTED, motor cycle and sidecarrier, also lightweight—Frimley Water Co., Frimley Green, Surrey. [5695

WANTED, combination, A.J.S., Enfield, Sunbeam; lowest.—Parsons, 190, Broadway, Hendon, N.W. [5690

WANTED, fast combination, Harley, Clyno, Norton, Triumph preferred; cheap.—Else, Dimple, Matlock. [X5044

2¾h.p. Twin J.A.P. Engine; particulars and lowest cash price.—Will Moore, Westville, Riddlesden, Keighley. [X5037

TWO Fixed Cups, two adjusting cups, and two cones for Rex 1911 2-speed wheel.—Schoolmaster, Molland, Devon. [X5057

WANT a good combination, must be cheap, and not earlier than 1914.—H. Druce, Apsley End, Hemel Hempstead, Herts. [5686

WANTED, A.J.S., Enfield, or Sunbeam twin sidecar combination; cash waiting.—Collier's Motories, Deal St., Halifax. [5652

WANTED, good up-to-date second-hand accessories; state particulars and prices.—Service Co., 292, High Holborn, London. [X4741

WANTED, a Douglas crankshaft, for 2¾h.p. twin, 1913.—Apply, F. Light, The Royal Oak, Elizabeth St., North Woolwich. [5613

WANTED, planet Roc gear wheel, for 1912 Humber motor cycle.—Chalmers, 75, Sommerville Drive, Mount Florida, Glasgow. [X4779

AUCTIONEERS' ANNOUNCEMENT

Owing to Expiration of Lease,

MR. S. G. CUMMINGS

Has been favoured with instructions to

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PREMISES OF THE PHŒNIX SIDECAR MANUFACTORY,

736, Holloway Road, Upper Holloway, London, N., on

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the

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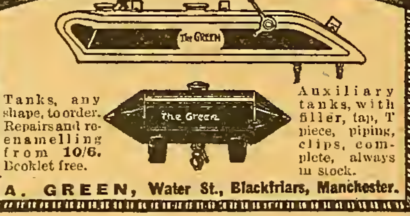

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PERCY and Co. require at least 100 second-han motor cycles and combinations. Please offer your mount. We offer exceptional high prices. W pay you cash on sight.—Percy and Co., 337, Eust Rd., London. [092

WE are buyers of motor cycles of the following make not earlier than 1914: A.B.C., A.J.S., Broug Enfield, Harley-Davidson, Henderson, Indian, Norto Sunbeam, Triumph, Zenith, and other good makes.—Write, giving particulars and prices, Service Co., 29 High Holborn, London. [X474

WANTED, 3½h.p. Rudge engine and Rudge T. handle-bars, 3-speed gear box with clutch an K.S. suitable for 2¾ Douglas; all must be new, nearly new; send particulars, date, and price.—Bo L6,324, c/o *The Motor Cycle.* [561

MORGAN'S Motor Mart, Sternhold Works, Strea ham Hill, London, require several motor cycle combinations, light cars, etc., for their customers o war work. Machines purchased for cash or sold on commission of 5%. Accessories and parts also wante —Manager (Sales Department), Mr. F. Smith, lat A.S.C., M.T. [X488

SEND Your Motor Cycle to Palmer's Garage, Tootin Wimbledon Station. Cash offer will be tel graphed immediately on receipt of machine. Machin can be included in fortnightly auction without charg if offer not accepted. Reserve price may be fixed.—So address, Palmer's Garage and Auction Rooms, 183-19 High St., Tooting. [091

EXCHANGE.

7-9h.p. Indian Combination; exchange cycle car, sell £40.—H.S., 33, St. Stephen's Rd., Bow, [567

1914 4h.p. Zenith-Gradua, C.B. combination, f higher power solo.—33, Brownhill Rd., Catfor [569

EXCHANGE Morgan, A.C. J.A.P., as new, for goo bike and cash, or sell £100.—C.S., 497, Old Fo Rd., Bow. [563

JUNE 13TH, 1918

THE MOTOR CYCLE
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Air Cooling Problems.

A FORTNIGHT ago we published an article, which should be carefully read by riders, designers, and manufacturers alike, on the important subject of air cooling. The writer points out what serious disadvantages accrue from excessive heat, viz., pre-ignition, generally caused by an incandescent sparking plug point; general loss of power, due to a combination of circumstances; distortion of various parts, owing to the wide range of temperature to which they are subjected (cylinder, piston, valves, valve seatings and valve caps are all liable to distortion); loss of compression, due in part to this distortion and in part to the loss of viscosity of the oil; expansion of gas before entry into the cylinder, with consequent loss of volumetric efficiency; the pitting of valves, especially the exhaust valve, involving much labour in grinding; excessive oil consumption, as much of the oil is burnt and escapes with the exhaust, while the residue is deposited in the engine, not only in the form of carbon deposit on the piston top and in the cylinder head, but on the underside of the piston, whence it falls in flakes into the crank case. This is already a long list, but another important point, not touched in the article to which we refer, remains, namely, the failure of the insulation of the plugs when they reach a certain temperature. Some plugs fail at quite moderate temperatures, and careful tests of this weakness were described in this journal some little while ago.

If the heat were uniform throughout the cylinder and piston but little harm would ensue, even if it were somewhat excessive, provided that the oil were not all burnt. It is the unequal heating of different parts that is so injurious, and it is pointed out in detail that this unequal heating is the result of irregularities in the cylinder casting, lumps of metal, such as valve caps, placed in different positions, the form and thickness of the fins, the cooling draught impinging on the front of the engine, and the internal conditions of induction and exhaust, the former naturally being cold and the latter very hot. To this we may add the fact that distortion, either of cylinder or of piston, is a further source of heat, because it allows the burning gases to pass between the parts and increases the friction between the remaining parts, often seriously.

Something might be done towards improving the draught by means of judiciously placed air scoops. Much can be done to prevent distortion by the adoption of a more symmetrical design of cylinder combined with the use of more suitable metals or alloys. The aero engine owes something to the motor cycle and motor cycle designers—we are glad to be able to record the fact that a most successful aero engine is the product of brains trained in the manufacture of motor cycles—and therefore the motor cycle industry need have no false pride nor foolish scruples about taking a hint or so from the aero engine.

Aluminium cylinders, with or without steel liners, give great possibilities of more efficient cooling to the post-war motor cycle engine. Copper or copper-coated fins offer an alternative system, not by any means to be despised; but it must be remembered that when a liner is fitted the contact between the liner and outer covering or fins must be perfect over the whole surface or local heating and immediate distortion will follow. Pistons of aluminium alloy also seem likely to become more or less general on mounts of the best class.

It should be unnecessary to take down an engine for decarbonisation more than once in a season, and valves should require grinding only at these annual cleanings. If these desirable results are attained it will be, we believe, partly due to the cooling problem being tackled in an efficient manner, though doubtless improved carburation and mechanical oiling will also contribute their quota to the end we have in view—the perfection of the post-war motor cycle.

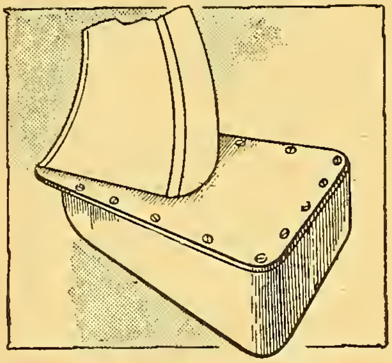
An index to the advertisements in this issue will be found on the page facing the back cover

IDEAS: Useful and Ingenious.

Readers of "The Motor Cycle" are invited to contribute to this page any ideas successfully adapted to their motor cycles. Contributions will be paid for at our usual rates. Rough sketches will suffice

A USEFUL ADDITION TO A FRONT GUARD.

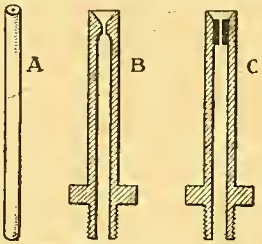
THE front mudguard on some machines with peculiarly shaped horizontal flaps can be much improved by the addition of a U shaped downward extension to the back and sides of this flap, as sketched, which will be found to keep both machine and rider very much cleaner, and its efficiency can be gauged by noticing the amount of mud collected in it during a ride.


An efficient extension to the front mudguard.

The one actually illustrated was made from 20 S.W.G. sheet aluminium, the bottom edge being beaded round 10 S.W.G. wire and the top edge flanged inwards and secured to the guard by small brass screws and nuts.—F.B.S.

MAKING CARBURETTER JETS.

IN experimenting with a Binks three-jet carburetter, I found a 000 jet too large for the pilot jet, and in reaming out a 0000, which was a trifle too small, spoilt it by making it too large. Having no means of drilling a small enough hole I could not make a new jet; but the following idea solved the problem.



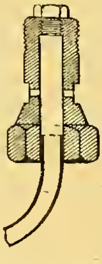
A. Watchmaker's bush wire. B. Spoilt jet. C. Showing the piece of hollow wire in position.

I had in stock some clockmaker's bush wire. This can be got from clock repairers in various sizes, and is drawn brass wire with a minute hole running through it. In this case it was about $\frac{3}{32}$in. diameter, and had a hole which would just take the end of the finest jet reamer I could get—considerably finer than Binks 0000.

I drilled out the end of the spoilt jet to $\frac{3}{32}$in., and sweated in a piece of the bush wire $\frac{1}{8}$in. long, taking care not to block the small hole with solder. The end was then countersunk and the jet reamed out to correct size. The job has proved quite successful.—A. SHARVELL CULLWICK, Wolverhampton.

EASY STARTING.

THE sketch shows a simple alteration carried out on an Amac carburetter which greatly facilitates starting. A hole of $\frac{1}{4}$in. diameter is drilled in the bottom of the jet holder, and a pipe from the auxiliary petrol tank is soldered in. When a start is to be made the tap is turned on, and, as the tank is above the jet, the petrol will force itself out and enable a very easy start to be made. This device has been in use for some time on a Calthorpe-Jap, and is very successful.—N.V., R.N., Dartmouth.

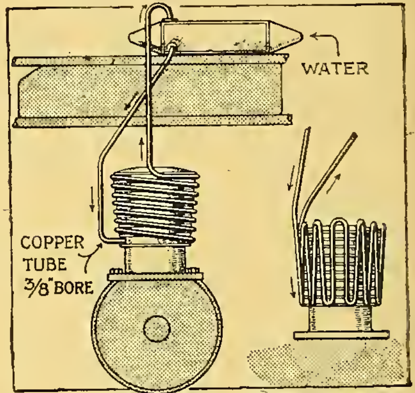

A device for facilitating easy starting.

RESEATING A TYRE VALVE.

THE best plan is to reseat the valve in its original place. Take a patch, making a hole in the centre slightly less than the diameter of the valve barrel. Stretch this over the valve barrel after removing the nut and washer; solution its under side and also that part of the original valve patch on to which it will descend. Apply two thin films of solution and let each dry thoroughly. Then work it down to the valve barrel, being careful not to touch the under side with dirty fingers, and when it is pressed well into place and adhering over its entire surface, push the middle washer down on the valve stem. Screw down the nut, and give plenty of time to dry. Another tip in connection with valves is the rejuvenation of the rubber. By moistening them in warm water and working them in the hand apparently perished valve rubbers can often be utilised.

A PROPOSED CHEAP AND SIMPLE METHOD OF WATER-COOLING.

A SMALL auxiliary tank (such as at present used for starting purposes) is intended to be filled with water, having a copper pipe protruding from the bottom portion down to the engine or cylinder, as shown in the diagram, thence circulating around the cylinder in any suitable manner. The return end of the copper tube would be fixed to the upper portion of the water tank.



A reader's idea for an improved water-cooling system.

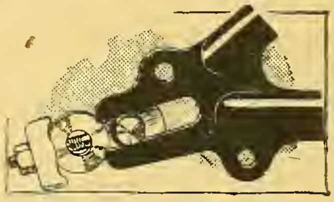
When the engine gets warm, the water in this tube rises, to be replaced by cold water, as in the ordinary water-cooling system.

As copper itself dissipates heat to a larger extent than any other metal, it therefore acts independently of the water as a cooling medium.—H.G.T.

[A similar idea was embodied in the Cayenne motor cycle which was entered in the last T.T. race. The utility of the device is, however, very questionable.—ED.]

CHAIN ADJUSTMENT.

I AM forwarding a simple way of adjusting a chain when the adjuster will no longer act. A washer is placed between the slot for the wheel spindle and the adjuster end. I have used two such for some months with satisfaction.—(REV.) A. E. SAUL.


A useful chain adjuster.

OCCASIONAL COMMENTS

BY 'IXION'

Stumped.

LAST year I ventured the statement that no case of "vibration flooding" with a top feed carburetter had come under my notice. A reader challenges the statement with an eloquent impressionistic story of a dead fly lodging on the needle seat of his top feed. I am ready to learn, I hope, but I do not quite see how vibration caused the dead insect to assume such a position.

Steel Substitutes.

WHEN the motor cycle weights of the future are discussed, people always seem to take it for granted that there will be no advance in metallurgy. The steel industry has advanced by leaps and bounds during the last decade or so: and its advance was due to the pressure of a demand. Among the qualities which our engineering industries demanded in their ideal steels, lightness scarcely figured. So far as lightness has been attained, we have reached it indirectly. We have developed tougher steels, so that a small shaft or pinion of a modern high-grade steel will bear stresses which twenty years ago could only be entrusted to a lump of metal many times as heavy and as large. If we set a 1900 type gear box pinion against its successor of to-day, the contrast resembles that between a water wheel and a motor cycle timing pinion, or thereabouts. The aircraft industry is now shrieking for light metals: and sooner or later the demand will procure a supply. Just as built-up spars of plywood or bentwood will tend to replace heavy spruce and ash timber, so featherweight metals will in time oust weighty steel, just as steel and light alloys have already ousted cast-iron. These tendencies will react on the motor bicycle. If I live to be a really old man, I expect to see my grandson straddling a motor bicycle as bulky as those of to-day, and scaling 50% less; in other words, I will venture a prophecy that the 1960 edition of the, let us say, Triumph roadster will look as big as the 1917 model, but will not weigh more than 112 lb.

The Aëroplane Again.

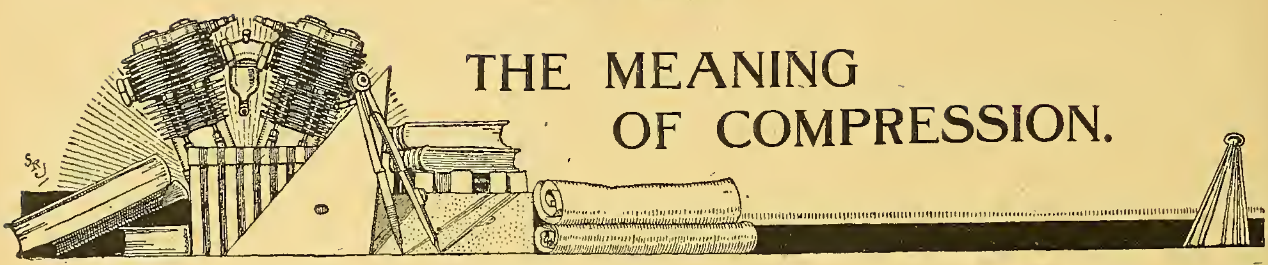
IT is, of course, absurd to pretend that a demand for a given substance directly creates that substance; if it did, I presume $99\frac{3}{4}\%$ of mankind would be millionaires. But demand creates indirectly. Humanity is faced by a new need. Altruism, covetousness, and other factors instantly concentrate many of the best brains on the supply of what will meet the need. At present the aeroplane is the crudest of engineering feats, its engine only excepted. It is made of wood and linen and wire and glue. These materials have two merits—they are cheap to buy, and they are easy to repair after a crash. On the other hand, they deteriorate with extraordinary rapidity. The linen is only usable after numerous coats of expensive dopes and varnishes; and even at that, it is grossly unsuitable for covering surfaces which should maintain an accurate contour, because it sags. The wood is short-lived, and possessed of no great strength; its main strength is derived from the bracing wires, which require prolonged attention from an ultra-skilled staff after every flight. Thus the aeroplane creates an unquestionable demand for a huge supply of wholly novel metals, ranging from a featherweight covering metal for the planes to featherweight tubing for spars and struts. These metals will undoubtedly materialise. Their development will be enormously hastened as soon as "crashes" become exceptional experiences, and cheap repairs cease to be of practical importance. As the aeroplane has borrowed freely in its infancy from the car and the cycle, so in its prime it will repay the debt, with interest added thereto. The very aeroplanes which are the pride of the R.A.F. to-day will excite the incredulous derision of our sons, just as the few surviving boneshakers make us reflect that the pioneer cyclists must have been hardy lads.

Minus One Cylinder.

HERE is a bone for the torque *v.* balance merchants to quarrel over. On reading the recent discussion, some of us deliberately ran several types of twin with one cylinder cut out. The only machine which we found "sittable" under these circumstances was a flat twin. Whilst not particularly pleasant at low speeds, is was infinitely superior to the V's under similar conditions; and when revved up a little it ran so well on one cylinder that an inexperienced rider might not have guessed there was anything amiss with it up to the limit of speed obtainable.

Two-in-one.

I HAVE often said that in one respect the flat twin engine is tantalising. It is the easiest thing in the world to discover a flat twin which can rev. on a low gear, for nearly all flat twins do it. It is not an unknown experience to encounter a flat twin which can pound away on its top gear under a heavy load or against a stiff gradient. The early Douglases were pretty useful at this particular stunt, and I have happy memories of a Brough which habitually indulged in it. But it is quite exceptional to strike a flat twin which can rev. *and* pound, in the sense that I could apply those verbs to my last Triumph, for example. I always tuned it on the middle gear, and knew it was near the top notch if I got 40 m.p.h. "instrument speed" on that gear; with the same tuning it would rush really steep hills on top with a roar, and also clamber up stiffish slopes at one pop a minute. I never yet owned a flat twin which earned quite the same praise. But I hear that the new Raleigh engine combines both extremes to a very high degree. When I get a chance to try this 'bus, I may have more to say. Incidentally, I hope that its spring frame will set the rigid merchants thinking.

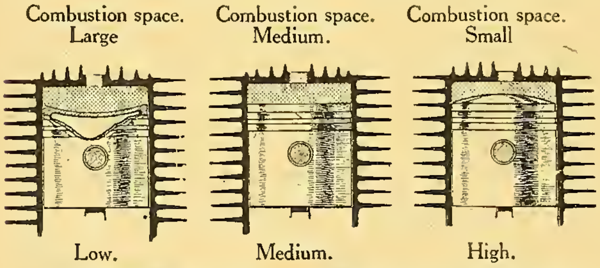


THE MEANING OF COMPRESSION.

MOTOR cyclists may be divided into three classes: (1.) The really skilled, having some knowledge as to the why and wherefore of the internal combustion engine. In practice these men are usually excellent for obtaining niceties of engine tune. (2.) The man of the multitude, who has learnt how to keep a machine in repair, can do his own adjustments, but has insufficient knowledge to enable him to obtain competition results. (3.) The raw novice, who knows nothing beyond starting, stopping and steering his machine, and who regards a companion of two years' experience as an absolute encyclopædia of knowledge.

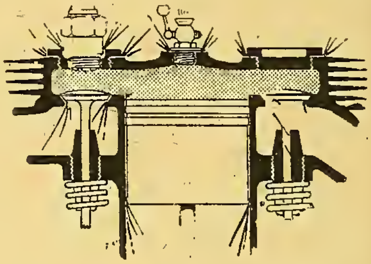
What does compression mean to these three classes? The first knows what it is, and therefore can be eliminated. The second knows what it is when he loses it, and decides to grind in his valves. The third regards it as an illusive something that dropped off at the last hill, and that is why he has to push up the next.

"Compression" is one of those gloriously elastic terms which the engineer uses in one sense and the amateur in another. To the professional it means the actual pressure attained in the combustion space when the piston has attained the top of its stroke. It has nothing to do with burnt valves and oval pistons. It is decided by the ratio between the total volume of the cylinder with the piston at the bottom of its stroke (*i.e.*, the c.c. plus the combustion space) and the combustion space alone. A long stroke engine, however, has not usually a high compression; on the contrary, a long stroke engine is usually a low compression engine, having a large combustion space, for in order to make use of the length of stroke a steady push is required, rather than a violent explosion. By igniting the charge at a comparatively low compression we get this steady push, whereas by compressing it to a very high pressure we get the violent or rapid explosion, and high revolutions thereby made possible. Also we get a tendency towards knocking, and a type of engine with which it is necessary to keep up the "revs."



These diagrams show how the compression ratio of an engine may be reduced or enlarged by the use of a different piston without altering the stroke, and illustrate the meaning of high and low compression.

Coming down to practice it will readily be seen that the best type for pulling heavy loads at comparatively low speeds is the low compression. In this class we may take the P. and M., which is a single-cylinder moderate-powered machine, that has developed on the lines of a hard slogger simply because everyone insisted upon fitting a sidecar to it. It is because the P. and M. is a low compression engine, tuned for hard slogging, that it will tow a heavy sidecar at its own gait almost anywhere, and it will be recalled that in 1914, I believe, the makers fitted a concave piston to enlarge the compression space still further, and thus lower the compression.



Showing the meaning of bad compression as distinct from low compression. An engine in which leakages are shown past the piston rings, valves, valve caps, and sparking plug.

Given low compression, therefore, we have the elements of a hard slogging, hard pulling engine, but it is the combination of compression and valve timing that gives these results. That is, it must not be thought that by fitting thick washers between the cylinders and crank case of a high revving flat twin, and thus reducing the compression, we shall obtain a hard pulling engine which will slog away and never knock when abused. The whole valve mechanism would have to be revised ere such an engine were suitable for sidecar use, and by merely lowering the compression we should simply rob the engine of its revving capabilities, while we should gain very little as regards hard pulling under load.

The Two Types.

By raising the compression of a low compression engine, on the other hand—*i.e.*, by fitting a flat topped piston instead of a concave—we straightaway obtain very much higher revs., and the machine is probably improved for solo use. In the days when I used to ride low compression singles—a vice now abandoned—I always found they were at their best for solo use when they reached that point of carbonisation at which knocking became noticeable with a sidecar, and my last P. and M. was at its fastest after about 1,800 miles of steady riding.

The foregoing, I trust, will assist one or two amateurs to a better understanding of the word compression from an engineer's point of view. A high compression engine is one which has a small compres-

The Meaning of Compression.—

sion space above the piston when the piston is at the top, the length of the stroke being taken into consideration. Then the unignited gases are at a high pressure when the spark occurs, and a violent explosion takes place, giving a quick impulse to the piston but tending to cause a knock should the load be too great. The explosion of paraffin vapour is very rapid, and therefore a very low compression engine is necessary if a knock is to be avoided with that fuel. A low compression engine is one so arranged that the charge in the combustion space cannot attain a high pressure before ignition, and therefore a more or less slow burning explosion takes place, giving the piston a push rather than a kick, and therefore rendering the unit better suited to sidecar propulsion than to speed work.

Volumetric Efficiency.

This does not enter, from the enquirer's point of view, into the question at all. The volumetric efficiency of an engine is nothing whatever to do with its efficiency for its size or for the amount of petrol it uses. An engine having volumetric efficiency of the very highest might be an absolute dud on the road or under bench test, for volumetric efficiency simply means the efficiency of an engine as a pump. That is to say, an engine of perfect volumetric efficiency is one which draws in a volume of gas exactly equivalent to the displacement of the piston stroke, and volumetric efficiency is decided by the size of the valves, the lift given them, and the absence of obstructions in the induction pipe and exhaust. If it were possible to remove the entire cylinder head for induction and exhaust, then we should have an engine of 100% volumetric efficiency—a thing most British engineers aim at, while most Americans ignore it. It is nothing whatever to do with the length of the stroke and the size of the compression space, and therefore it is a mystery quite apart from that of compression.

The Amateur's Version.

So much as regards compression from the engineer's point of view. The amateur need not bother himself about this side of the question, and whether or not his engine is high compression, whether it has a short stroke or a long, need not trouble him in the least so long as he is retaining the compression his pet manufacturer has decided is good for him.

Compression from the amateur's point of view is the stuff that leaks if his cylinder wears oval, or if he neglects his valves, and let us be quite clear on one point. You have no doubt heard it said that so and so's machine, which is a notorious glutton for speed, has no compression whatever, and you at once decide that in the art of timing good compression need not be taken into account. Once I possessed a most extraordinary cycle car, and all my friends were surprised to find that in starting it up one could swing round the handle like a sewing machine. "Good night—no compression at all!" was the usual comment.

Loss of Compression.

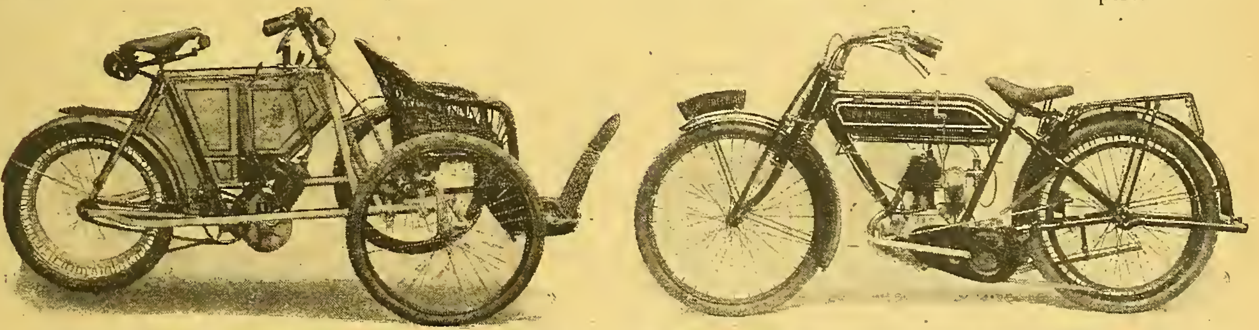
As a matter of fact the compression of that engine was pretty well prefect, and the fact of the matter was that it was an unusually "low compression" engine, having heavy flywheels, and it pulled an unusually high gear.

But—and this is the point the amateur must bear in mind—whatever the natural compression of his engine, every atom of gas lost past the piston or through the valves is *power lost.* These low compression engines which carry everything before them are low compression because their engineers decided thus—not because gas is lost or the volumetric efficiency is low. If you are going to obtain better results you must make sure that none of the charge drawn in is being wasted, and naturally, if your engine is a low compression engine, there is not the same need for glass-faced valves and perfectly bedded piston rings as there is with a high compression engine.

This is one great point on which the low compression engine scores. It is obviously easier to keep in tune than the high compression, and when more than one cylinder is used one can safely consider it the most practical type for general use. CHINOOK.

POST-WAR TRADE.

Another body, having for its object the development of post-war trade, is The British Empire Producers' Organisation, with headquarters at Evelyn House, 62, Oxford Street, W.1. The secretary of this organisation appeals to all trades to formulate a policy which may be placed before the Imperial Conference to be held in June. At this conference representatives of the Dominion Government will be present, and the views of British traders on the following matters could be conveniently presented: (1) As to the measures needed to give to British industries the security necessary for development after the war. (2.) As to the steps necessary to prevent Germany or any other foreign nation from regaining any measure of control of the industries and finance of the Empire.



An old tricar and a modern lightweight, having engines of somewhat similar dimensions. A popular tricar of fifteen years ago had a low compression 2 h.p. Minerva engine, 269 c.c., which, combined with a low gear ratio, could propel a passenger load at slow speeds; a lightweight J.A.P. of 2½ h.p. = 292 c.c., is a mount capable of double the speed with a much lighter load.

CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

June 13th	9.45 p.m.
,, 15th	9.46 ,,
,, 17th	9.47 ,,
,, 19th	9.48 ,,

June.

This is the time of the year when one used to think of T.T. races and the Scottish and English six days trials.

Cigar Lighters.

We are informed that a smoker was prosecuted recently for illegally using petrol in a cigar lighter. More rumours?

Chichopoxtle.

It is reported from Mexico that a new fruit has been discovered that contains a high percentage of good quality lubricating oil. It is known as Chichopoxtle.

Celluloid Finish.

We have heard of experiments in connection with celluloid covering for the tubing of motor cycle frames. The handle-bars of Rudge machines have been so treated for some years.

Order—or go without.

This, in effect, is the meaning of the new Paper Restriction Order, the details of which are indicated in our advertisement pages. You must either order your copy of *The Motor Cycle* in advance or go without it. Chance purchases at bookstalls will now be very difficult, and at small shops will be practically impossible.

Draw in Aid of the 17th R.W.F. Band Fund.

As a result of this draw, which we have previously dealt with, no less a sum than £350 has been remitted to Col. the Hon. H. Lloyd-Mostyn!

Imagination.

A youthful reader advises us that by fixing a twig against the spokes of his push bicycle he can make a sound almost like a motor cycle.

Motor Cycles in India.

A correspondent writes to us from a tea-planting district in South India as follows: "We have quite a number of motor bicycles and sidecars in this part of the world, which is 4,000 to 7,000 feet above sea level."

Law re Petrol Tins.

At Matlock County Court on Monday, before Judge Macpherson, William Hand, garage proprietor, Matlock, sued W. E. Ganney, of Old Chorlton, Kent, for 3s. 6d., the balance of a sum owing for motor hire. Defendant had, it appeared, handed in seven empty petrol tins to Mr. Hand, who had allowed him 1s. 6d. each for them instead of the 2s. which Ganney claimed was customary, and he therefore deducted the 3s. 6d. now claimed from his taxi bill. The Judge, in giving his decision, said that the plaintiff was justified in only allowing 1s. 6d. for the empty tins as the petrol had not been purchased from him, and he found for plaintiff for the full amount claimed.

Special Features.

THE MEANING OF COMPRESSION.

DANGEROUS TRAMLINES.

ECONOMY OF THE MOTOR CYCLE.

Rustless Iron.

A company has been formed at Shepperton-on-Thames to manufacture aeroplane and other fittings of rustless iron, which is produced by a new process called "doxidising."

Sleeve Valves?

Recently we saw a V twin-engined motor cycle which was as silent as a car. Apparently it was fitted with sleeve valves, but our view from the upper deck of a tramcar did not permit a close examination.

The Spirit of the Pastime.

There is more in motor cycling than in most sports and pastimes. Despite the petrol restrictions and the fact that nine-tenths of pre-war motor cyclists are in khaki, the interest in motor cycle design always shown by our readers is as keen as ever.

Engine Starters.

Since the introduction and abandoning of engine starters by the Merkel and Indian makers we have heard very little of "press the button" devices on motor cycles. It may be remembered the Merkel device was an arrangement of springs, while the Indian was electrical.

A group of motor cyclists and light car owners of the Headquarters Central Detachment Special Constabulary (A.A. Section). The third rider from left is H. C. Horswill, formerly of the Essex Motor Club, a competitor in the London-Edinburgh and other competitions. F. A. Applebee and the late Lt. O. C Godfrey, R.F.C., were both members of this detachment.

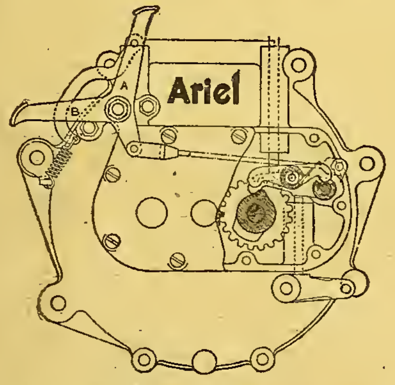
EASY STARTING

OF THE

ARIEL

MOTOR CYCLE

The easy starting of the Ariel is specially mentioned in nearly every letter we receive from owners. The following are a few extracts selected at random.



The Ariel (Patent) Decompressor.

A simple mechanical device—absolutely positive in action—nothing to get out of order. To bring the decompressor into operation the front lever (A) is placed in the forward position, and the rear lever (B) pressed down to bring the engine under full compression.

"Even on to-day's so-called petrol, mine starts at first kick."—W. D. W., Redbourne.

"The other night the bike was left out from 12 a.m. till 8 a.m. in a perfect rain storm. When I got to her in the morning she started up with the first kick."—
Dr. G. H., Shetland.

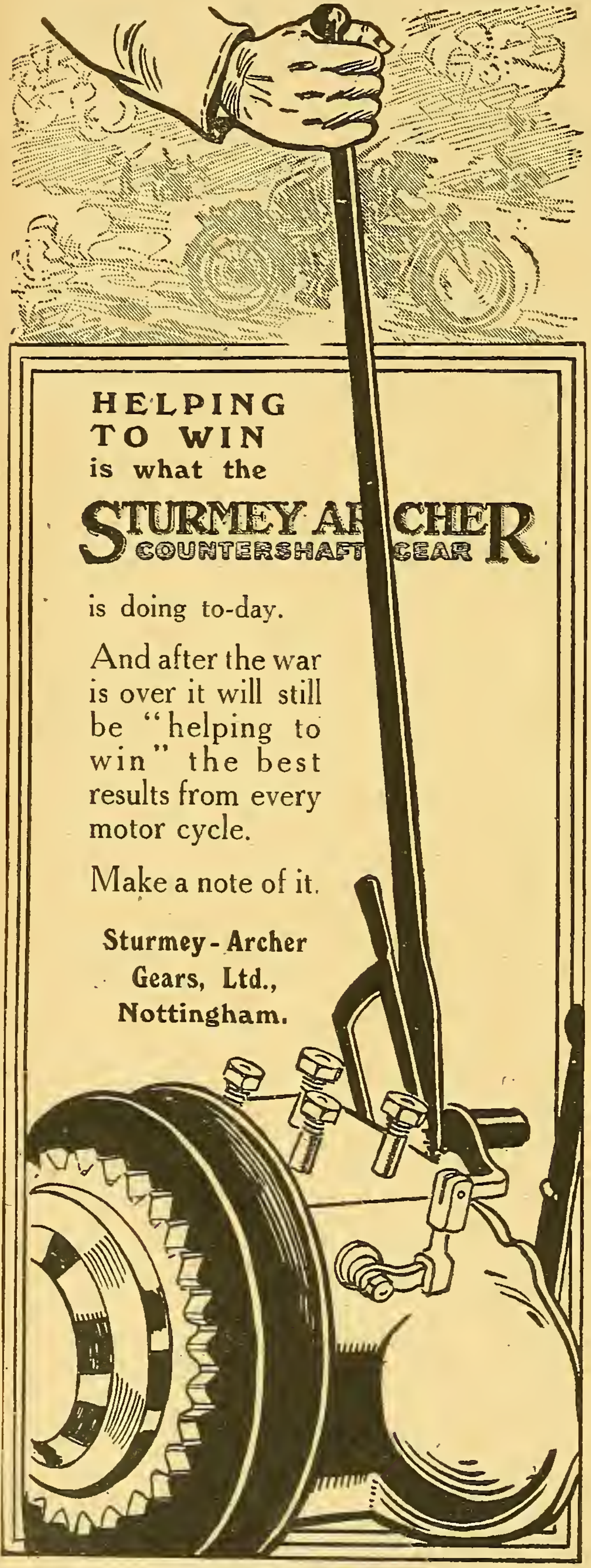
"It is easy starting and most powerful on hills."—B. S. W., Stowmarket.

"I find the easy starting a great comfort."
—Dr. D. M. H., Bolton.

"The easy starting decompressor is a revelation."—A. B., Ulverston.

Art Catalogue post free from—

ARIEL WORKS, Ltd., 3, Bournbrook, BIRMINGHAM.



HELPING TO WIN
is what the

STURMEY ARCHER COUNTERSHAFT GEAR

is doing to-day.

And after the war is over it will still be "helping to win" the best results from every motor cycle.

Make a note of it.

Sturmey-Archer
Gears, Ltd.,
Nottingham.

In the light

of practical experience the JAMES proves its supremacy over all other British-made machines.

Then why not invest in a

JAMES

for your next new motor cycle?

Our range satisfies all needs, being made throughout by practical riders.

No. 6—4¼ h.p. "Big Single," 3-sp., for Sidecar £79
With James Canoelet Sidecar, £20 extra.

No. 7—3½ h.p. Twin, 3-sp., with hand-controlled clutch, for Solo £79

No. 8—2¼ h.p., 2-st., 2-sp., Lightweight ... £50

No. 9—5-6 h.p. Twin, 3-sp., Sidecar model £84
With James Canoelet Sidecar, £20 extra.

Although mainly producing motor cycles for the BRITISH and ALLIED GOVERNMENTS, we still have a limited number available for civilian use, and orders are being dealt with in strict rotation.

Therefore—if you want one—you should get your name on our "Earliest Delivery List" without delay.

The JAMES Cycle Co., Ld.
GREET, BIRMINGHAM.

London Depot: 23, Holb. Via., E.C.1.
Birmingham Depot: Broad St. Corner.

Prices and Fuel.

These are two matters that cannot be kept too much to the fore nor too frequently discussed. Petrol at over 4s. a gallon (including the tax) and the price of a new sidecar combination in the neighbourhood of £130 make one think hard of the future prospects of motor cycling.

A 3½ h.p. Sidecar Combination Enthusiast.

Recently Maj. Hodgson had his 3½ h.p. Sunbeam sidecar stolen, but, fortunately, it was soon recovered, being found abandoned in a road at Hoxton by a policeman two days after it had disappeared. The numbers were unaltered and the machine uninjured, except that the toolkit, pump, and spare tube were missing. The thief had evidently been taken with panic and had left the combination. Maj. Hodgson left it outside a house in London for an hour, and when he came out it had gone. He tells us that it is the best sidecar outfit he has ever owned, and that he finds a 3½ h.p. combination much more interesting to drive than a big twin. "I have," he tells us, "taken a passenger up Birdlip on it on second without a falter, and that was after a long, hot run. It may interest you to know that I have an F.R.S. lighting set run off the magneto. With the exception of the lamps it only cost £2 2s., gives a wonderful light, and is more reliable than any dynamo set I have ever seen."

Major H. Graham Hodgson, R.A.M.C., winner of *The Motor Cycle* Cup on the occasion of the United Services Motor Cycle Race Meeting at Brooklands, September 4th, 1915.

Manufactured Petrol.

During a lecture before the American Electro-Chemical Society, a Mr. L. B. Cherry, an electrical engineer, stated that it is possible to produce synthetic petrol. Mr. Cherry claims that by producing chemical union of a gas (such as natural gas compound chiefly of methane or hydrogen) with a hydrocarbon (such as paraffin), by subjecting the gas and paraffin vapour to a high frequency high potential electric current, it is possible to reorganise the molecules so as to produce a fuel of the nature of petrol.

British Magnetos after the War.

Many people have expressed anxiety as to how our new industries, such as the magneto industry, will fare after the war when foreign competition is again to be encountered. It is therefore interesting to know that Lord Burleigh's Committee advocates the prohibition of any importation of magnetos from enemy countries after the war and an *ad valorem* duty of 33% on those imported from other countries.

British Magneto Firm's Prosperity.

The Fellows Magneto Co., Ltd., appears to have more than justified the enterprise which gave rise to its inception some eighteen months ago. The dividends recently declared are 9½% on the preferred shares and 15% on the ordinary, and this result has been obtained during a period of only nine months' full working of the new factory.

The King's Birthday Honours.

Among the recipients of Honours of H.M. the King's birthday is the name of Sec.-Lt. George Geoffrey Smith, Royal Air Force, who is appointed a member of the Most Excellent Order of the British Empire for services rendered in connection with the war. Mr. Smith was editor of *The Motor Cycle* up to the time of his joining the Air Service.

Other recipients of honours well-known to motorists are: Commanders of the Order of the British Empire, Mr. Edward Mauger Iliffe, Controller Machine Tool Department, Ministry of Munitions (Mr. Iliffe is of the firm of Messrs. Iliffe and Sons Ltd., proprietors of *The Motor Cycle* and our sister publications); Mr. Edward Shrapnell-Smith, Chairman of the Standing Joint Committee Mechanical Road Transport Associations, Chief Officer controlling the Petrol Executive. Officer of the Order of the British Empire, Mr. Granville E. Bradshaw, the designer of the A.B.C. motor cycle.

A Hydraulic Engine Starter.

A "week-end" experimenter is working hard perfecting a hydraulic engine starter for motor cycles for which he claims that by turning a tap and sitting upon the saddle the engine will be made to start.

"After the War."

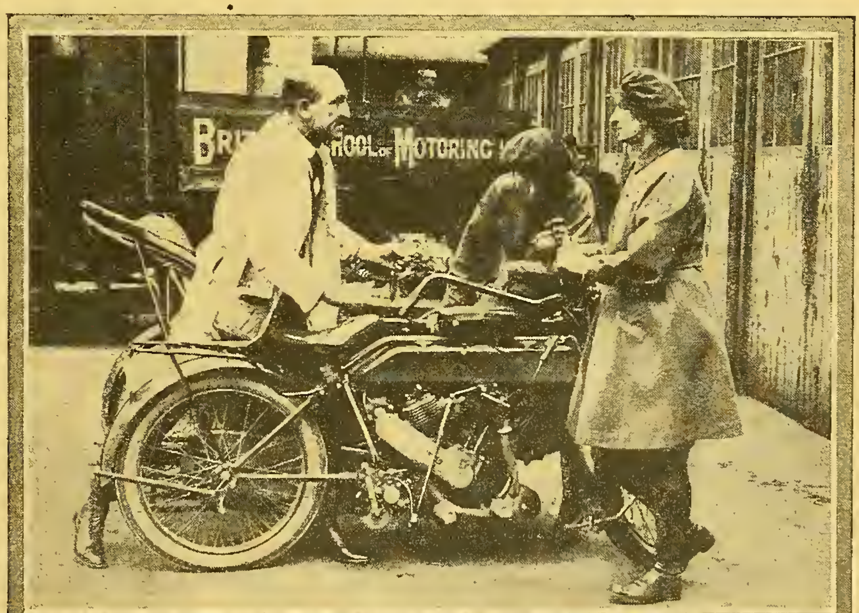
Some time ago we inserted on this page a paragraph on the possibilities, or probabilities, of the petrol situation immediately after the declaration of peace. We stated that, as far as we were aware, Dora would remain in operation till she was repealed.

"Duration of the War."

The subject is revived by an announcement in the dailies of June 6th that a Parliamentary Committee is now in existence to determine the official interpretation of the term duration of the war. In other words the committee has to decide for how long after the declaration of peace shall existing regulations under Dora be continued.

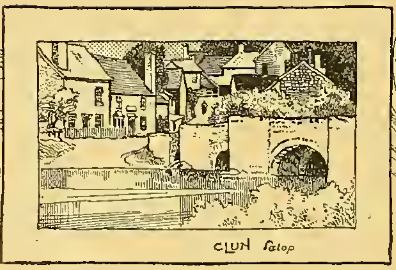
A la the Motor.

Frequently it is said that the motor cycle is a glorified pedal cycle. In America there are cycle models closely resembling the motor cycle, which are in fact, lightweights minus engine. We have also seen a pedal cycle with a neat countershaft gear, which permitted the use of a very neat oil bath case, as the driving and driven sprockets were of the same size.

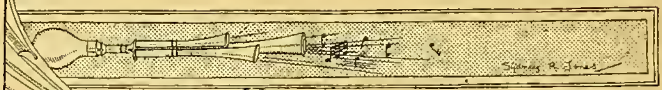


THE HEROINES OF PERVYSE.

—The Baroness de T'Serclaes and Miss Mairi Chisholm, whom we recently referred to in *The Motor Cycle* as having been badly gassed. They are no longer able to carry on their splendid hospital work in the Belgian lines, and are now taking a preparatory course of motor cycling at the British School of Motoring preliminary to joining the Royal Air Force.



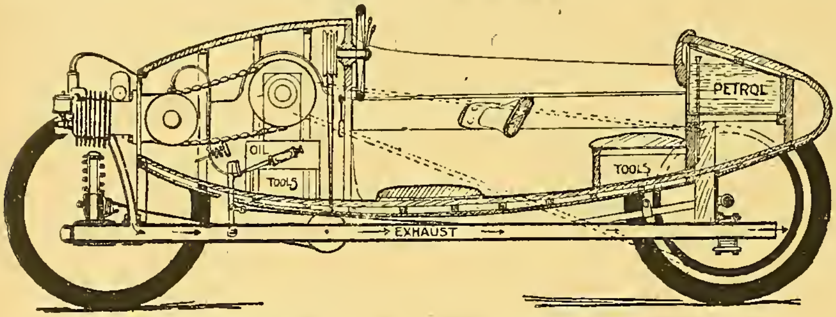
The Very Simple Cycle Car.



Seating Accommodation v. Mechanical Perfection.

THE cycle car was introduced as a motor cycle redesigned to give the driver the same protection from the elements as that enjoyed by the passenger in a sidecar combination. It finished up by being a car in miniature.

At the present time there are many signs of a cycle car revival. In any case, greater interest is being taken in the type than has been the case for several years, and the question naturally arises as to which type of runabout is in the minds of those who may reintroduce this "step between the sidecar and light car."

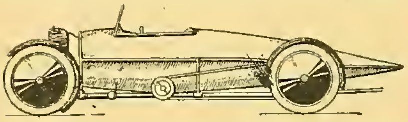


Side sectional elevation of the Gibbons two-seater cycle car, which weighs less than a sidecar combination.

There are three known types of runabout: (1.) The three-wheeler on the lines of the Morgan, the success of which may exert considerable influence over manufacturers. (2.) The belt driven simple cycle car such as the G.N. (3.) A cheaply produced little car following car practice, generally with, say, an air-cooled V twin engine.

A New Type.

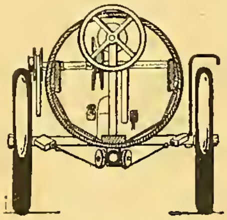
There is, however, still another type, which is not only interesting, but appears to offer certain possibilities for development. Since one machine of this type has been built and run for some 3,000 miles, has a speed of 45 to 50 m.p.h. and a petrol consumption of 85 to 90 m.p.g. with a load of two persons, one is justified in naming the type after its designer and builder, Mr. E. Gibbons; hence the fourth kind of cycle car, which may be considered in the running when cycle cars again are introduced, may be known as the Gibbons type, just as three-wheelers like the runabout from Malvern will always be referred to as being of the Morgan type.



A sporting runabout designed by an Eton boy, embodying many of the features of the Gibbons design.

A solo motor cycle is nine-tenths machine and one-tenth accommodation. With a sidecar combination the accommodation figure is much higher, with a car higher still; with the Gibbons type of runabout one may say that the accommodation element predominates, while the opposite to the Gibbons may be imagined as a 60 h.p. car fitted with a pair of bucket seats.

A car with just bare necessary accommodation suggests that it has been built to propel itself, but because the human element is necessary to manipulate its wheel and levers the designer tardily agrees to allow the driver the use of a seat. The Gibbons type of vehicle is exactly the opposite; the motoring idea is started at the other end of the proposition. Instead of an ingenious machine fitted with a body, it is a body fitted with machinery to propel it.



Front section of the Gibbons cycle car.

To make my point more clear, I will cite the case of the invalid's Bath chair. Here we have a chair to accommodate a passenger. The wheels and other ironwork are necessary, but the chief item in the specification is the chair. That is the Gibbons idea, to build a body for the accommodation of the passengers and fit it to the necessary machinery to propel it. Instead of being a car built around an engine and gear box, with a body added because it was necessary, in this case the body is all important, and it is the machinery that is embodied because it is necessary—a very different thing from usual practice.

At the motor shows, makers display bare chassis and complete cars. The Gibbons idea would be to show bodies and complete cars. There is a great deal of difference between the two, and it arises probably because the average British motorist attaches more importance to the details of the mechanism than the comfort of the body.

As a direct result of this line of thought a little vehicle has been produced which, although having four wheels, weighs considerably less than a sidecar combination with the same mechanical units.

Constructional Details.

Mr. Gibbons's runabout here illustrated has a 3½ h.p. engine and an epicyclic gear and weighs only 16 lb. over 2 cwt. A sidecar machine with such an engine and gear would weigh considerably more.

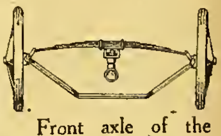
The method of construction permits a very light but strong body being built. Upon thirteen two-ply hard wood hoops are fixed forty laths ¼in. thick and tapering towards each end from the largest diameter of the body where they are 2¼in. wide. These are made a dead fit, and afterwards covered with canvas and varnished.

I think I am right in saying that one or two concerns built sidecar bodies by this process just before the war, and when they were finished a very smooth exterior was obtained.

In the nose of the body is a circular iron plate to which the cylinder of the engine and the crank case are secured.

The only frame member is a straight tube between the axles which also serves as an exhaust pipe.

An Eton boy (E. S. Reynolds) has now submitted a similar design, but whether it is coincidence or intended as a development of the Gibbons runabout is not clear. However, the design shows a racy looking machine, which will appeal strongly to the sporting section of the motoring fraternity.



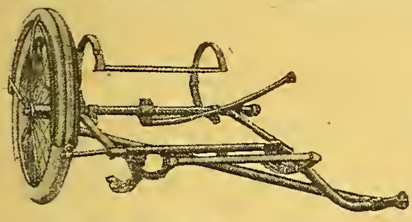
Front axle of the Reynolds design, showing the transverse springing and central frame tube.

The whole point suggested by these designs is that there must be a place in future motoring for a runabout type of machine which weighs no more than a sidecar combination, which should cost no more to manufacture, no more to run (excepting slightly increased taxation), and give the driver a comfortable seat out of the mud, dust, and wet—so adding to the comfort of sidecarring.

A.

A NEAT SIDECAR CHASSIS.

THE American idea of beauty in connection with sidecar body design does not, in any way, coincide with the standard of the Englishman, and therefore the average American sidecar fails to interest the motorist on this side of the Atlantic. However, we think the chassis illustrated here will be of interest to our readers. There are several features which make for simplicity and neatness, among which the design of the frame at the point where it is secured to the motor cycle is particularly good. The diagonal tube from the motor cycle to the sidecar wheel should lend strength, while the weight must be considerably lower than that of many designs which only secure the same results by additional tubing and connections. This chassis is made by the National Machine Co., of Goshen, Ind., U.S.A.



The chassis of the new National sidecar, an American production. The diagonal tube from the motor cycle to the wheel of the sidecar is a noticeable feature.

THE MOTOR CYCLE IN AMERICA.

A Frenchman's Views.

IN a recent issue of *L'Auto* there appeared an article written by M. Vallée-Picaud expressing his views on the motor cycle boom in America. M. Picaud was, before the war, agent for the Clyno in Paris, competed in the Paris-Nice trial in 1913 and 1914, and he was also a competitor in reliability trials held by our principal Allies. When war broke out he served with the French Army as a despatch rider.

M. Picaud points out that the motor cycle has a vogue in the United States at the present time, which is only equalled by that which occurred in England previously, but which France will enjoy after the war. At the moment he is in the United States, and he has certainly studied the question extensively. He enters at some length into the uses to which the motor cycle is put in the States, and quotes instances of even cowboys chasing their herds, on motor bicycles, armed with the famous lasso.

He mentions how much the sidecarrier is utilised for delivering goods, and how keenly the Americans are alive to the fact that the motor cycle can be used with success and far more cheaply than the motor car. He speaks of the excellent work done by the motor cycle mounted police in various cities, and how energetically the dealers and manufacturers carry on their advertising campaigns.

He points out that the American public has not the same mechanical knowledge as the English, that American sidecars are comfortable, but are not so luxurious as those made in Great Britain. Chassis are rigid and solid, and the state of the roads demands this. M. Picaud also expresses his admiration of the way in which a motor cyclist, having bought a machine, can register it and take out the necessary formalities with the greatest ease. The motor cyclist goes to a special office, usually close by where the machine is sold, a declaration is made before a notary, and a tax of $2.50 is paid for a sidecar machine; he then receives a number plate to fix to the machine. The number plate is at the same time a receipt for the registration and a permit to drive. The whole procedure only takes ten minutes.

To hope for such an ideal as this in our own red tape bound country may be too much, but the ideal is perhaps worth bearing in mind. And does it not serve as a hint as to how the oft-discussed tax on pedal cycles might be levied?

To obtain *The Motor Cycle* Regularly after JUNE 24th

Every reader must give a definite order either to a newsagent or to the publishers.

AN official Order has been issued by the Board of Trade which prohibits the system of supplying newspapers on "Sale or Return."

This comes into force on JUNE 24th, and after that date only those readers who have given standing orders can be sure of obtaining their copies of *The Motor Cycle.*

In the past it has been the custom to allow newsagents to return unsold copies and this enabled them to hold supplies for the convenience of travellers and other occasional purchasers.

Under the new Order this custom must cease, and newsagents obviously cannot be expected to risk having unsold copies left on their hands. In future they will take enough copies to supply definite orders only.

Readers who have not already done so should give their orders for "The Motor Cycle" at once and thus avoid disappointment.

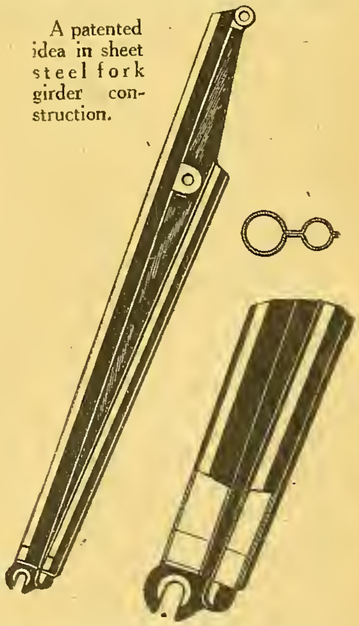
THE OVERSIZE TYRE.

THERE is a marked tendency at the present time for manufacturers to consider seriously the question of fitting larger tyres. A few years ago the 26in. × 2¼in. size was regarded as a standard tyre for a 3½ h.p. machine; then, owing to the increased weight of machines, brought about by the introduction of change speed gears, etc., it was found desirable to increase the size to 26in. × 2⅜in., and finally 26in. × 2½in., or 650 × 65 mm., tyres came into almost general use for machines fitted with countershaft gear boxes and intended for sidecar work. Probably the last mentioned size is the limit, so far as the medium-powered single is concerned, but for 5-6 h.p. and 7-9 h.p. twin combinations we may see the oversize 3in. tyre exceeded.

Certainly riders used to large 700×80 tyres on a heavy combination all declare they will never again think of anything less if they can help it. And war roads—which will also be post-war roads—are an advocate of oversize tyres whose convincing eloquence will take some beating.

SHEET STEEL FORK GIRDERS.

APROPOS the article on pressed steel frame construction by "Mechanicus" in a recent issue, it is interesting to note that Mr. William Starley (whose name is well known in the cycle world) has patented a system of constructing fork girders of sheet steel. From the illustration, it will be seen that each girder is cut out of one piece of sheet steel, which is made to form two tubes with a web between them. No doubt such construction would be stronger and much cheaper to produce than the conventional method of brazing tubes into machined lugs, provided, of course, the output were sufficient to justify the cost of the tools, and there is no reason why other units of the frame, such as back and chain stays, should not be so constructed.



A patented idea in sheet steel fork girder construction.

THE ECONOMY OF MOTOR CYCLING.

Some Examples to Show how an Increased Use of Petrol would aid Reduction in Railway Traffic.

THE recent necessity to travel from the Midlands to the West of England by rail demonstrated once again the remarkable economy of the motor cycle, and incidentally emphasised two points. First, the superiority in speed and business usefulness of road travel over railway travel as at present restricted. Second, the absurdity of petrol restrictions when viewed from the aspect of comparative economy.

Regarding the First Point.

The journey in question was between two large towns, ninety-four miles apart by road. We have frequently covered this route in three and a half hours, non-stop each way, at an expenditure of just over two gallons of petrol, or a total running cost for the return journey (quite possible in one day including three or four hours' business) of about 8s. 6d. solo, or, say, 10s. with sidecar occupied.

Petrol being taboo, we travelled by rail, on the shortest route (115 miles), by the fastest trains now running, in just over four hours, and no return journey was possible on the same day if any business was to be attended to.

The bill was as follows:

	£	s.	d.
Third class rail fare	1	7	6
Increased lunching charges over country prices		3	0
Hotel for one night, say		12	6
Trams and other conveyances, sundries, etc.		2	0
Total	£2	5	0

(or for two people about £4), and the loss of a day into the bargain.

The Second Point.

We were told repeatedly that there was a critical need for conservation of petrol supplies in this country, and a big reduction has been effected accordingly. Now we are being told that there is a further critical need for at least 40% reduction in railway passenger traffic. There can be little doubt which causes most expense to the State, the journey of ninety-four miles by road or 115 miles by rail. The economy to the individual is obvious. Following the arguments through, would it not be an advisable proceeding to allow a freer use of petrol under some system of permits for necessary business journeys to relieve the already congested railway traffic? No question of extra transport of petrol Overseas is involved; the amount coming in appears to be ample for the allotment of a portion to this purpose, and many riders have sufficient in stock for a number of such journeys before making application for more.

By a close co-operation between the Petrol Controller and the railway authorities much might be done to reduce passenger traffic, and particularly season ticket traffic.

A more striking example occurred in a journey between two important Midland manufacturing towns fifty miles apart, or a two hours' run by road. By train it is now impossible to travel in the morning to keep an appointment before midday. As this was imperative, it was necessary to travel overnight, with the consequent hotel expenses. The distance by rail is over sixty miles.

The comparative expenses for the two journeys are as follow:

FIRST JOURNEY.—BY ROAD.

Return journey	188 miles.
Travelling time	7 hours.
Cost—solo	8s. 6d.
sidecar	10s. 0d.

Return journey and business in one day.

BY RAIL.

Return journey	230 miles.
Travelling time	8½ hours.
Cost—solo	£2 5s. 0d.
two persons	£4 0s. 0d.

Return journey and business two days.

SECOND JOURNEY.—BY ROAD.

Return journey	100 miles.
Travelling time	4 hours.
Cost—solo	5s. 0d.
sidecar	6s. 6d.

Return journey and business in less than one day.
Open air and health.

BY RAIL.

Return journey	120 miles.
Travelling time	6 hours.
Cost—solo	£1 10s. 0d.
two persons	£2 15s. 0d.

Return journey and business best part of two days
Overcrowded carriages and unhealthy conditions.

The necessary expenses for meals, being common to both modes of travel, are omitted.

The following suggestion for reducing season ticket traffic is not so unreasonable as it may appear at first. When a regular holder of a season ticket for business purposes on short or medium distances wishes to renew his ticket, the question could be put to him—are you a motor cyclist? Are you prepared to take an allotment of petrol in lieu of a season ticket, and so make your journey daily by road? If he agree, the railway company should make a requisition to the Petrol Control Department to supply Mr. So-and-so with the necessary amount. On the permit or licence could be stipulated the particular journey for which it was granted. In many cases half or one gallon per week would relieve the railway of one passenger.

The progress of various types of locomotion at the present time is shown in an interesting London traffic return recently published from Mr. H. Hewitt Griffin's statistics. While a decrease in the number of motor vehicles on the road is only to be expected under present conditions, it would appear that London of all cities in the belligerent countries (excluding, of course, America) has suffered least. For instance, public service motor vehicles have actually increased in numbers since last year, the figures being 2,042 and 2,036. Similarly trade vehicles have increased from 329 to 340; private cars have decreased from 166 to 149.

The percentage decreases from last year in the case of motor vehicles amount to about 5.58%, and 51.97% for pedal cycles.

THE MOTOR CYCLE AVIATION SECTION

The enormous importance of the Air Service needs no emphasis; it will certainly be a determining factor in the winning of the war. The need for men in every branch of aviation is imperative. There is no class in the community better fitted to become flying officers or air mechanics than motor cyclists, a large percentage of whom are young, keen men with sporting instincts, mechanical knowledge, and plenty of nerve.

In the days of voluntary enlistment we were able to enrol no fewer than 11,000 of our readers in the R.E. Signals (D.R.'s), Motor Transport Section, Motor Machine Gun Service, Tanks, etc., a sufficient testimony to the patriotism of motor cyclists. To-day we feel that we can render no better National Service than that of keeping our readers informed of Air Service developments, and, we hope, stimulating and maintaining their interest therein. Therefore, we purpose to devote some editorial pages of "The Motor Cycle" each week to aviation matters without, however, in any way neglecting the primary function of this journal, namely, the fostering and encouragement of the motor cycle movement and the development of the machine.

We realise, too, that motor cyclists, after the war, will be among the first to take up seriously the art of flying, and so, in endeavouring to perform a patriotic duty now, we are also preparing for the future needs of our readers, who, therefore, will welcome on both counts, we hope, this new feature in our paper and theirs.

Rotaries and Radials.

Those who talk of radial engines when in reality they mean rotaries should remember that although a rotary is a radial a radial engine is not necessarily a rotary. Equipment officers, please note!

◆

"Nibs" on Design.

The technical staff responsible for the examination of British engine and aeroplane designs is principally located at Pen Corner House, Kingsway. Members of the staff are, as a consequence, appropriately referred to as the "Nibs."

◆

Those Big Bombers!

The performances of the American Liberty "airplane," and particularly the engine, are anxiously awaited by the Royal Air Force. Like many British manufacturers in the past, our American cousins have evidently discovered that successful airplanes are not produced quite so easily as "shelling peas."

◆

German Rotary Engines.

The Motor Cycle hinted several months ago that the Germans would ultimately be driven to revise their engine policy and adopt the rotary engine for their fighting scouts. Late last autumn there were rumours that new German scouts fitted with such engines had been sighted well over the Hun lines, and that our pilots were trying every trick to shepherd one or two of these machines across to our side so that an engine could be procured for examination—a common dodge when the existence of a new power unit is suspected. Several of these machines have now been satisfactorily crashed over Allied soil, but the bubble has burst. The engines are either captured Allied rotaries, or very ordinary copies thereof, constructed at the Oberursel works, which represented the Gnôme patents in Germany before the war.

Aero Engine Types.

The air-cooled aeroplane still continues to grow in favour—in this country, at any rate. Meanwhile, the Huns still stick to their six-cylinder water-cooled engines—and may they continue to do so.

◆

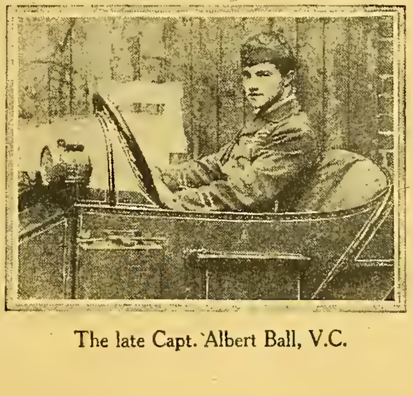
The Man at the Helm.

Sir Arthur Duckham, K.C.B., Member of Council, Air Group, has lately assumed control of the Departments of Aircraft Production. The appointment was necessitated by Sir William Weir's promotion to Secretary of State for the R.A.F.

◆

AIRMEN MOTOR CYCLISTS

The late Capt. Albert Ball, V.C., D.S.O., M.C. (son of Alderman Albert Ball, J.P., Nottingham, a director of the Austin Motor Co), was one of our most famous airmen to meet a brave death at the hands of the Hun. Capt. Ball destroyed over forty German aeroplanes and a balloon. In addition to being a pilot, he was also a motor cyclist. His last mount was a Morgan Runabout, which he used frequently when in England to convey him to various aerodromes. We have, of course, previously given particulars of Capt. Ball's exploits.



The late Capt. Albert Ball, V.C.

The First Internal Combustion Engine Driven Airship.

Paul Haenlein, a German, is reputed to have been the first to propel a dirigible by means of a gas engine. This was about the year 1860.

◆

An Italian Airman and the World's Records.

A sergeant in the Italian Flying Corps established recently what is said to be a new world's record for speed. He flew from Langley Park, Hampton Roads, Va., to Washington in a Spa fighting plane in one hour. The distance is 145 miles

◆

Spare Time Models.

So great is the interest now taken in aeroplanes that several big boys (over military age) of our acquaintance are building models for their sons ranging in age from three months to thirteen years. Those who have not sons usually find a nephew to whom they can *promise* the finished article.

◆

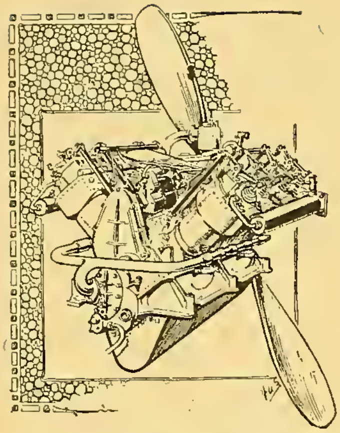
Night Landings.

One of the greatest difficulties in landing at night is to be dead certain that the machine is gliding level and will touch ground with both wheels simultaneously. Should one wheel touch before the other the undercarriage will crumple up, and one wing hit the ground a terrific blow.

◆

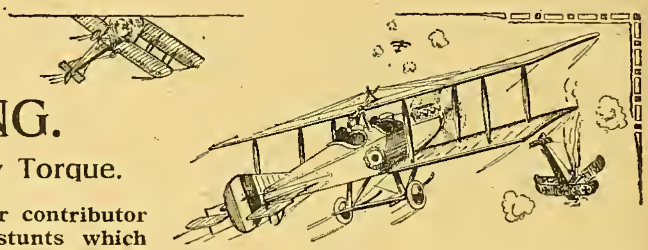
The Monoplane.

The monoplane is reappearing in combat over the Western Front. When the war began, France had many Morane "parasols" in commission, but they were soon discarded. An improved Morane has been recently tested, and its climbing ability and speed have found favour. To give the pilot an unhampered view, the planes in the new model are placed some distance above the fuselage.



STUNT FLYING.

PART IV. By Torque.



In this instalment our contributor deals with a set of stunts which commence with levering the machine over on to one wing tip.

We have already seen that as *surprise* is often the decisive factor in ground warfare, so in aerial fighting it is desirable to keep the enemy guessing about one's intentions. The loop, which has already been dealt with, is a stunt which lends itself to two or three different ruses. Much the same applies to a set of stunts which open with levering the 'bus over so that one wing tip points skyward and the other groundward, the planes exchanging their normal horizontal position for the vertical. A manœuvre which commences in this fashion may develop into at least three separate stunts, namely:

(1.) The vertical bank.
(2.) The wing-slide.
(3.) The roll.

In the first place, there is not the least difficulty in making a modern scout aeroplane stand on its wing tip, so to speak. The earlier aeroplanes were fitted with lateral controls—wingflaps (ailerons) or wing-warping gear—which were just sufficiently powerful to furnish the control required for normal flights, *i.e.*, to effect a rational turn, or to correct the lateral balance. The modern scout has lateral controls which will turn it bodily over in a couple of seconds, and, according to the fashion in which this enormous leverage is employed, one or other of the above trio of stunts can be performed.

For example, a glance out of the tail of a pilot's eye or the rip of bullets tells him that a Hun has caught him unawares, and he may wish to attack the aggressor. He is tail-on to the Hun, and he cannot attack until he is head-on, as his own guns only fire forward. If he thrusts the joystick sideways to the correct degree, the machine will cant over through 90° till its planes are vertical: and if he further uses his rudder, the 'bus will be wrenched round in a vertically banked turn. This turn may be continued through a full circle or part of a circle, as circumstances or Fritz's conduct may dictate. For example, if Fritz blunders straight on, desiring to avoid battle since his first swoop has failed, a vertical bank through a full circular turn will reverse the positions of the two machines, and the Britisher will now be on the tail of the Hun.

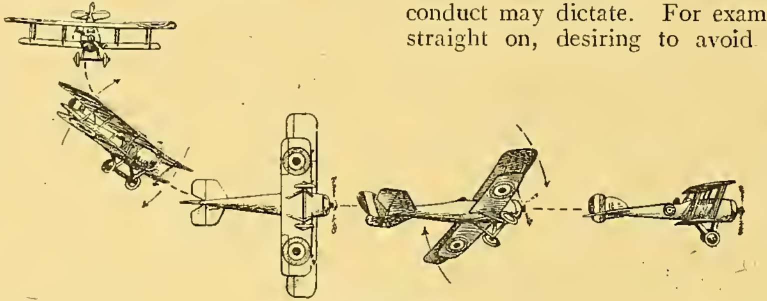


Fig. 1.—Vertical bank.

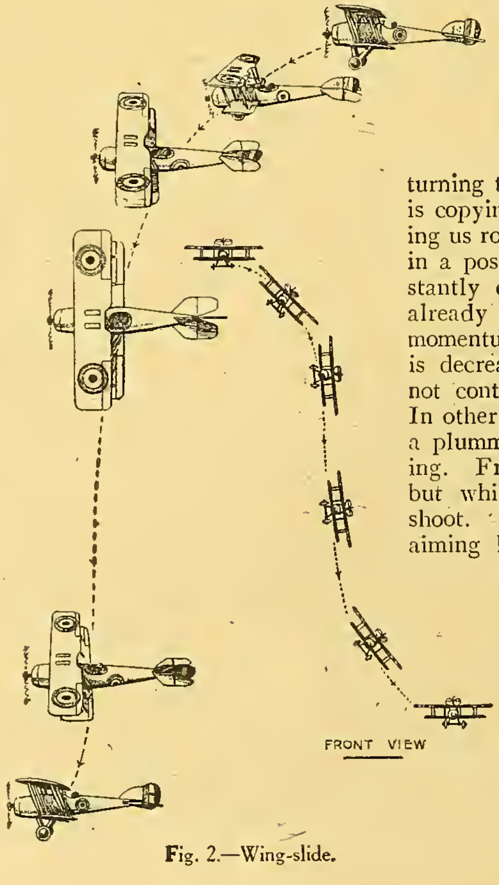


Fig. 2.—Wing-slide.

On the other hand, if Fritz has full stomach for a fight, and banks round after us, we are no better off than when we started to bank. He is still on our tail, and possibly has never ceased fire. Something must be done very quickly. Suppose that after turning through 180°, we realise that Fritz is copying all our movements, and following us round. Our planes are vertical, *i.e.*, in a position in which they furnish a constantly decreasing lift. If we have not already dropped, we owe the fact to our momentum round the turn. The momentum is decreasing rapidly, and if the turn is not continued, a wing-slide is inevitable. In other words, the machine will drop like a plummet, with the lower wing tip leading. Fritz can wing-slide too, if he likes, but while he is wing-sliding he cannot shoot. He can only aim his guns by aiming his fuselage at us: and a wing-sliding machine, though perfectly under control in the sense that it will not "crash" provided there is plenty of room between it and earth, is not under such control that its pilot can line up his sights till the slide has ended.

It is now clear that the vertical bank is a stunt which enables a pilot to change *direction* very rapidly, without any loss of height worth mentioning. On the

Stunt Flying.—

other hand, a wing-slide is a very fast type of *descent.* I have no space in which to work out a detailed comparison between wing-slides and other fast descents, such as the various kinds of dive. It is enough to point out that the path of descent varies according as a spin, a vertical nose dive, a tail-slide, or a wing-slide is employed, and that it is very useful to hoodwink an assailant by having several modes of descent up one's sleeve.

Still more violent or continuous use of the lateral control will cause the machine to "roll," *i.e.*, instead of poising itself on its lower wing tip, it will throw a side somersault whilst continuing to travel forwards. This movement is clearly shown in the sketch on this page.

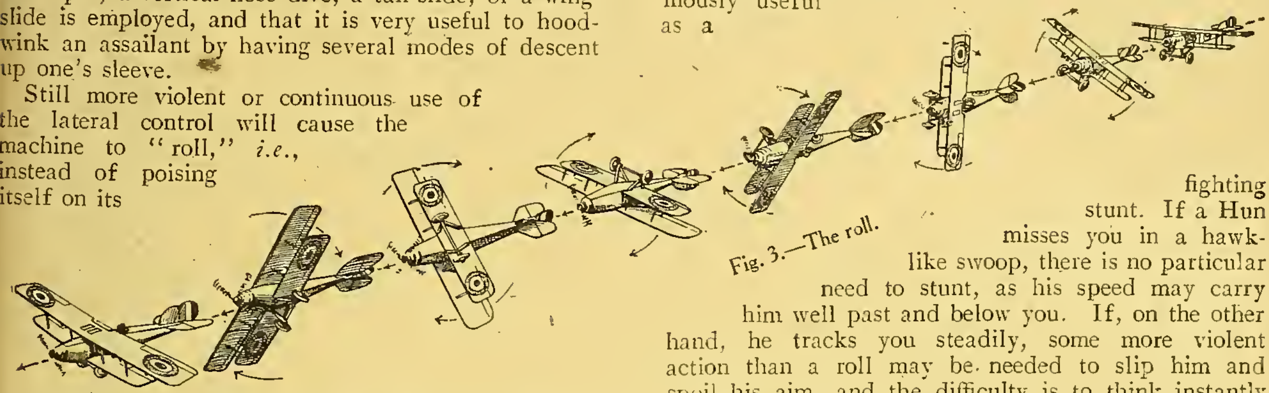


Fig. 3.—The roll.

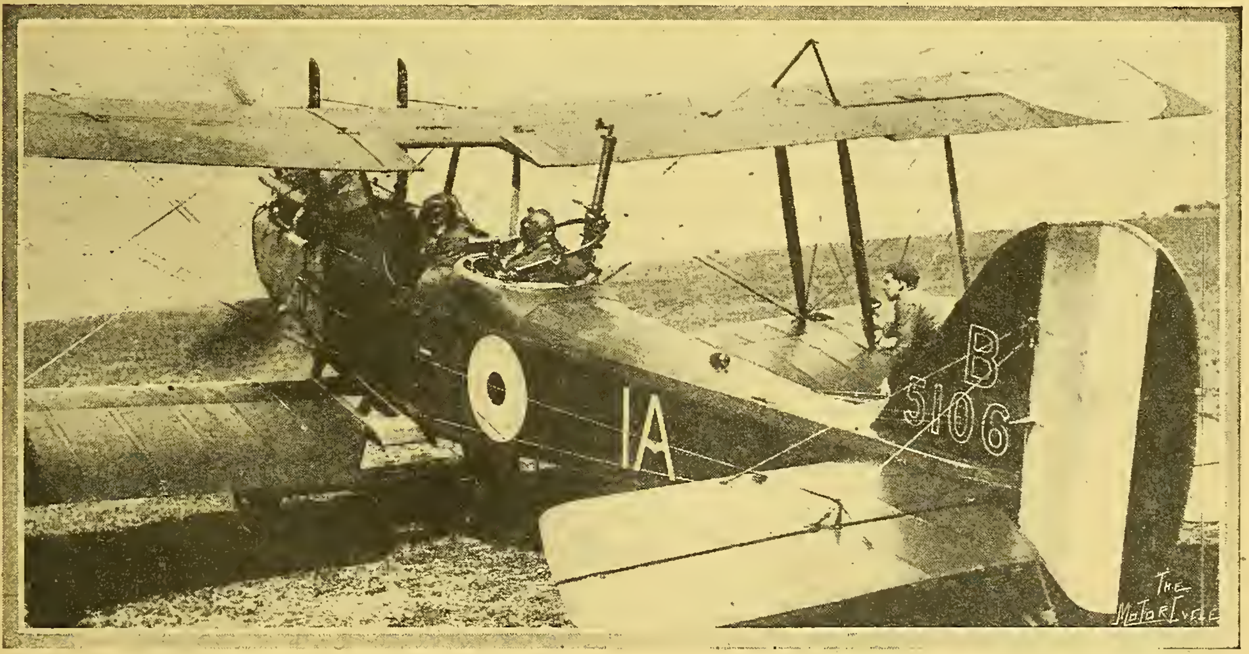
The Roll.

At one moment the left-hand wing tip is pointing vertically downward. A second or so later the machine has turned over on to its back, lost a little height, and swung a trifle to one side of its original course. A second or so later still, the right-hand wing tip is pointing vertically downwards, the machine has dropped still more, and has rolled still further off its original line of flight. It is tumbling sideways head over heels, like a rabbit shot in mid career. It cannot be pretended that a machine offers a very easy target in the midst of such gyrations. Still, the roll is not enormously useful as a fighting stunt. If a Hun misses you in a hawk-like swoop, there is no particular need to stunt, as his speed may carry him well past and below you. If, on the other hand, he tracks you steadily, some more violent action than a roll may be needed to slip him and spoil his aim, and the difficulty is to think instantly of the most suitable method of eluding him. Every tiniest moment of time is of importance in these encounters.

It should be noted that if it is not possible or desirable to terminate any of the above manœuvres by levering the machine back on to a level keel, the pilot throttles down his engine and puts his controls in neutral. The stunt should then resolve itself automatically into a glide. A crack pilot can usually assist the recovery by the use of his controls.

* * *

OUR AIRMEN ON THE WESTERN FRONT.



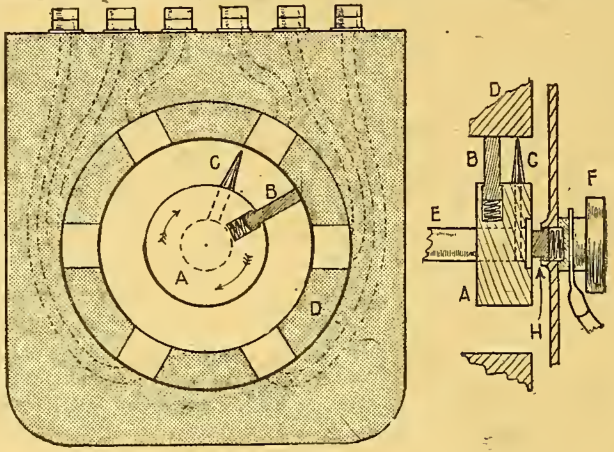
A British aeroplane on the Western Front about to start off for the German lines to work in conjunction with our artillery and infantry. (*Official.*)

THE "BOOSTER" MAG.

How Large Difficultly Swung Aero Engines are Started.

I WONDER how many of our readers have heard of a "booster mag." It is a special type of magneto employed for starting aero engines. Only the largest land engines and most seaplane engines possess electrical or compressed air starters: and "swinging the prop." of engines exceeding 200 h.p. is no great fun. It is obviously possible to get a fine spark out of any magneto, if it be disconnected from an engine and its armature is spun by a small handle. This is how the booster mag. is used. It is mounted in the cockpit, and the pilot spins its handle when the "ac-emma" (air mechanic) has filled the cylinders with gas, and put a cylinder on the firing compression. The current generated in the booster mag., which resembles an ordinary single-cylinder motor cycle magneto, is led by a cable to the distributer of the "service" magneto, mounted on and driven by the engine, and the "booster's" current is utilised in the distributer of the service magneto. Two special fittings are necessary. The booster current cannot be fed to the service rotor, for it would take the easiest path to earth *viâ* the H.T. winding, in preference to jumping a plug gap under compression. Secondly, as the piston of the engine is stationary, a much greater spark retard is necessary than the service magneto provides. These little points are easily managed. The booster cable is attached to a terminal on the centre of the distributer cover, and this terminal is connected by a rubbing brush to the service rotor. The currrent is not conducted to the service brush on the rotor, but to a steel point at the trailing edge of the rotor. Being set behind the service brush, this steel point has a good many degrees of extra retard, and the fact that it does not touch the distributer contacts is of no account, as the booster mag. is being spun pretty fast, and its spark can jump the gap. If everything is in order, the biggest aero engine will start easily on a booster mag., thus saving the air mechanics much exertion and a little danger. It also enables a pilot who has made a forced landing to get away again without the help of men to swing the prop.

TORQUE.



The "booster" magneto, a special type employed for starting aero engines.

A. Rotor.
B. Brush making contact with brush path.
C. Steel point connected to booster magneto; with small jump spark gap.
D. Brush path with six contacts.
E. Rotor spindle bringing current from Service magneto.
F. Terminal of lead from booster magneto.
H. Brush rubbing on brass disc in rotor, and connected to steel point.

D'ARTAGNAN IN THE AIR.

The Charmed Life of a French Airman.

APROPOS of the recent bestowal of the rosette of the Legion of Honour on Charles Nungesser, the French "ace," who has thirty-six victories to his credit (and who has been seventeen times wounded), there are many points of interest in the career of this plucky pilot not generally known. He is one of the few men who have been awarded the Médaille Militaire after less than a month of service. After a lurid career in the Far West of America, he returned to France, and enlisted in the Hussars at the outbreak of war. His superior officer was badly wounded in a nasty little scrap. Nungesser laid in wait at the angle of a road, and by good shooting succeeded in disposing of four German officers who were in charge of an approaching staff car. He impounded the car with all the verve of a d'Artagnan, and drove his officer back to headquarters. In his ragged and dejected state there was no chance of his being received by the general, so he blandly proclaims that he is a spy, and demands to be conducted to "*le Chef.*"

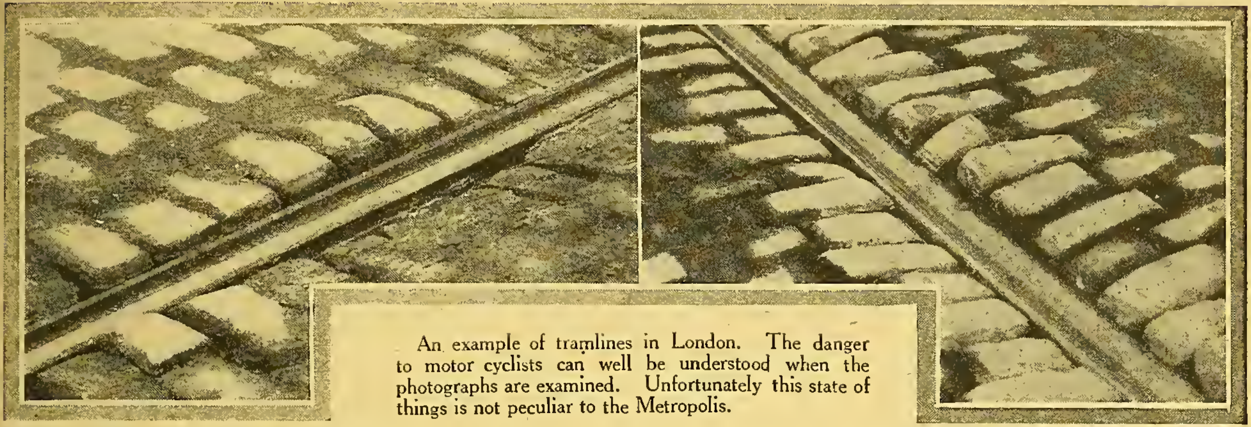
Follow explanations, felicitations, and the military medal, as a map found in the car furnishes valuable indications of German intentions with regard to Paris. Such a man could not long be kept out of the aviation service.

He has had frightful falls: on one occasion he was picked up with a broken leg, innumerable contusions, and yet another frightful wound, his palate transfixed by the control lever. Another man would have been killed outright, but, thanks to a phenomenal constitution, and his double dentition which saved his jaw, he was brought back to life. For three months he was laid up, fretting at enforced inactivity while his fellows were fighting for dear life at Verdun. He decided to go back. Remonstrance at such madness was unavailing, and he returned, saying, "Before the fortnight I will have my Boche!" Two days afterwards this man who could not walk, save weakly with the aid of crutches, made a flight, and brought down an L.V.G. after a few shots! Inside the week, on a frail monoplane, he tackled a heavy bomber—"aerobus" as he terms it! You see him next taking snaps of the *débris* of his victim in the woods of Hauts-Fourneaux.

Never was the gay little rosette better earned.

DANGEROUS TRAMLINES.

A WARNING OF WORN TRAM RAILS TO ALL MOTORISTS.



An example of tramlines in London. The danger to motor cyclists can well be understood when the photographs are examined. Unfortunately this state of things is not peculiar to the Metropolis.

EVER since tramlines were first laid in the public roads and streets they have been the *bête noire* of other traffic. It is perhaps not too much to state that badly laid and neglected tramlines have been the cause of more accidents, minor and major, than anything placed in or on the highways in modern times.

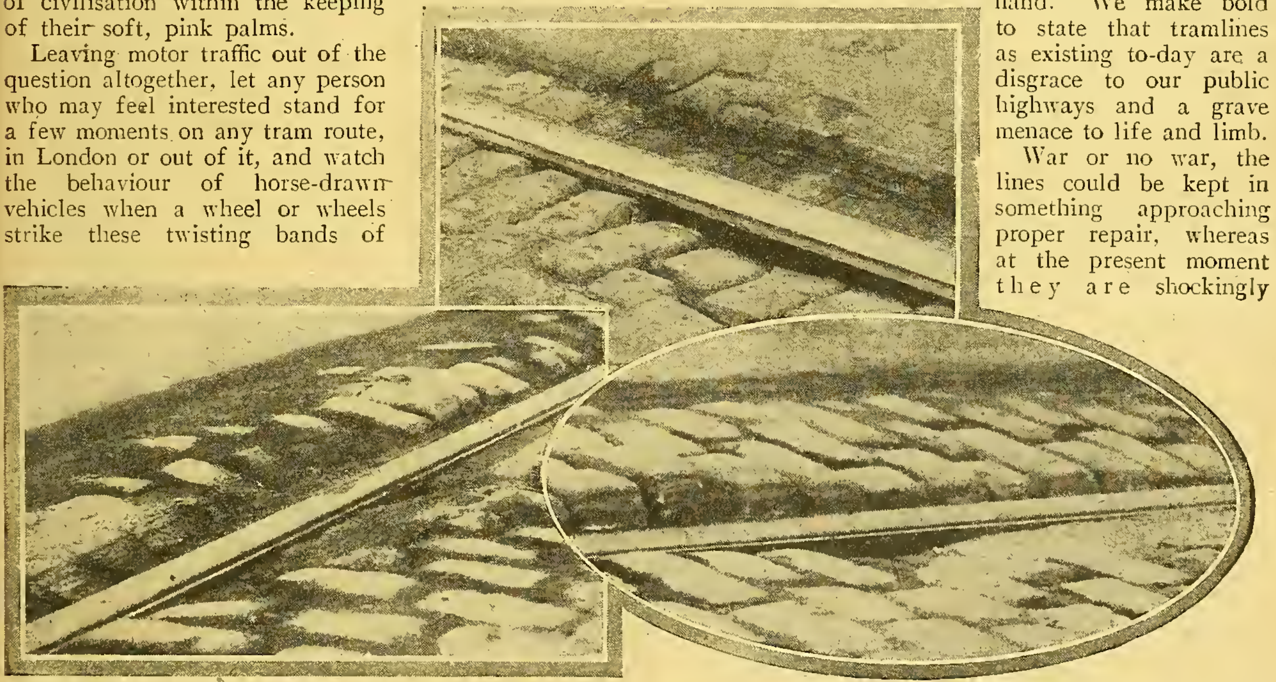
As a motoring journal, we anticipate that there will arise in the minds of the powers responsible for these tramways the opinion that we are biased, that naturally, or unnaturally, we are opposed to every form of travel that has not for its power unit the internal combustion engine. We cannot govern men's thoughts and minds, but could, if we so wished, let the above expected opinion rebound in like manner to those having the "welfare" of the vehicular bully of civilisation within the keeping of their soft, pink palms.

Leaving motor traffic out of the question altogether, let any person who may feel interested stand for a few moments on any tram route, in London or out of it, and watch the behaviour of horse-drawn vehicles when a wheel or wheels strike these twisting bands of "cussedness." It is no unusual sight to see a horse-drawn van proceed for several yards with one wheel locked against the projecting tramlines, the body proceeding at an angle to the fore part of the conveyance, to the undoing of any other vehicle or pedestrian that may be unlucky enough to be in the line of fire.

Some day, perhaps, we may see tramcars running on the overhead trolley system, but without rails laid in the ground. It is too much, we suppose, to hope that they will ever disappear altogether. Once a council or corporation, with ratepayers' money to spend, secures a hold on anything, it is a long, long time letting go, even though the whole thing is a palpable white elephant.

Submitting that we motor cyclists have got to bear it, we absolutely refuse to grin. Quite on the other hand. We make bold to state that tramlines as existing to-day are a disgrace to our public highways and a grave menace to life and limb.

War or no war, the lines could be kept in something approaching proper repair, whereas at the present moment they are shockingly



A further sample—many provincial cities and towns can show just as deplorable examples as these.

Dangerous Tramlines.—
neglected: so bad, indeed, are they that if they were the property of any private person or concern the district authorities would be down upon the owners right away, nor listen to any stories of there being "a war on," or shortage of labour, or anything else.

A glance at the photographs on the previous page will convey some idea of the state existing at the present moment on the routes in and around London. It needs no imagination to gather what would happen when the wheels of any light vehicle such as a motor cycle, sidecar, or light car became entangled in some of the traps shown, or have to cross one at a fine angle. The least to be expected is a very severe wrench to the wheels and axles of a three or four-wheeler, while the rider of a single-track machine would be lucky if he escaped a severe skid and an upsetting resulting in injury of a more or less harmful nature, if not death. In some places where the rails are laid in stone setts the stones stand above the common level of the road to more than half their depth, while at the same time the metal of the rails has sunk an equal amount, and on most routes these bad places occur every few yards.

That the companies know of this deplorable state of affairs is shown by the fact that on many routes men are busy filling up the depressions with loose sand, thereby covering and hiding the pitfall and making things worse, for as the wheels plough through the sand they easily displace it, leaving the unfortunate motor cyclist to emerge by a series of acrobatic tricks, or go under.

In the meanwhile there are plenty of old men about capable of such a small job as levelling a few stones and resetting them with a little cement. Failing which the routes should be closed altogether, as would probably happen were they private enterprises.

DOUGLAS SPRING FRAMES.

Notes on the Famous Bristol Firm's Patented Designs of Spring Frames.

IF proof were needed to show that the spring frame proposition is a problem difficult to solve, we should find it in the patent files. Here, too, we find evidence that British manufacturers are now alive to the necessity of insulating the machine from road shocks, and also that *The Motor Cycle* campaign in favour of spring frames is bearing fruit.

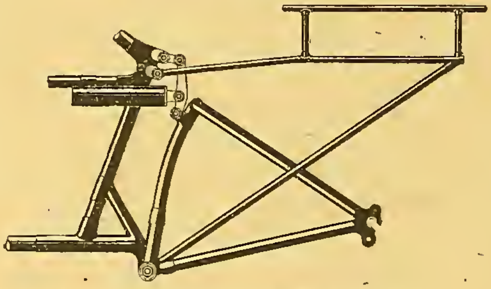


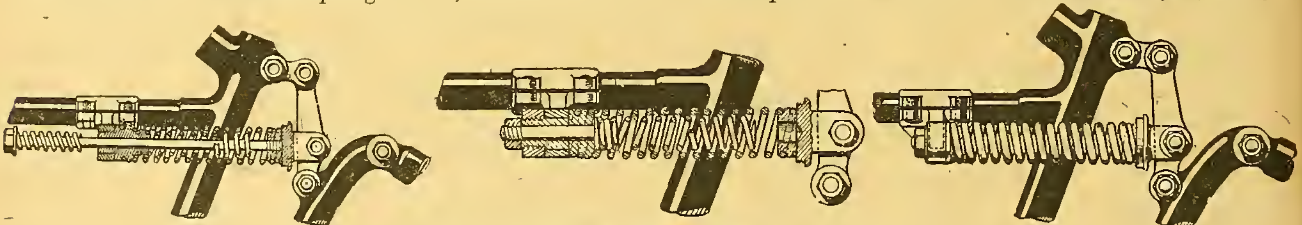
Fig. 1.—A spring frame recently patented by Messrs. Douglas Bros.

The two latest new machines in the British motor cycle world are the Raleigh and the Matchless. Both have flat twin engines and spring frames. The A.B.C. is another flat twin with a spring frame, while one of the latest models of the parent of the flat twin type—the Douglas—also has a spring frame. It may be remembered that the last mentioned machine has half elliptic cantilever springs. The patent files reveal that Messrs. Douglas Bros. are not content to consider their previous model as finality in spring frames, for we find no fewer than four subsequent patents, in which connection it is interesting to note that, for the time being at least, this Bristol firm is experimenting in a direction apart from laminated leaf springs.

We think that it is generally agreed that it is possible to obtain with coil springs all the results accruing from leaf springs with a reduction of weight. From this it would appear that the coil spring offers very decided advantages in motor cycle spring frame design, as weight is an important factor.

From the various patents granted to Messrs. Douglas Bros., it seems that these advantages are appreciated by this firm, and in fig. 1 we illustrate its latest patent in connection with spring frames.

In this design the coil springs are enclosed in a horizontal casing, the frame for the rear wheel being pivoted at its lower end and shackled at the top. The object of this patent is a design which permits the carrier to be efficiently sprung.


Figs. 2, 3, and 4.—Douglas springing patents of varying dates.

Figs. 2 and 3 are subjects of another patent, and show the principles of the spring action of fig. 1. It will be noted that the springs are anchored at both ends so that they act both in tension and compression. An auxiliary spring is located within the main spring, while in fig. 2 a second auxiliary spring is embodied, which, like the auxiliary spring within the main spring, only comes into action when the main spring has been stressed to some extent.

Fig. 4 illustrates a slightly earlier patent in which auxiliary springs are not included, while fig. 5 is another and earlier patent in which a single and shorter than usual coil spring is used.

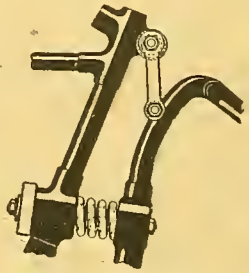


Fig. 5.—A comparatively early patented design.

Letters to the Editor

The Editor does not hold himself responsible for the opinions of his correspondents.
All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

THE FOUR-CYLINDER F.N.

Sir,—I have recently purchased a 1913 5-6 h.p. two-speed F.N. motor bicycle, geared 6 to 1 on high, 12 to 1 on low.

Will any of your readers experienced with this class of machine state if the standard gear ratios for solo work were as low as this, and also what speed I can reasonably expect to get?

I may mention that the cycle is now undergoing a thorough overhaul, and I had not covered more than seven miles previous to taking it down. CANTERBURY.

Thames Haven.

PLUG TROUBLE.

Sir,—*Re* letter from R. C. Meeson in *The Motor Cycle* of May 23rd, page 504, I would strongly recommend him to fit a Reflex plug (White Motors and Accessories). My experience with 4 point Bosch was that it "sooted up." I have used Reflex plugs for both car and cycle work, and found them really satisfactory. As you are probably aware, they are similar to Reliance, only more substantial. If your correspondent decides to fit one, I should be pleased if he would let me know the result. Usual disclaimer.

Douglas. RUDGE.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—Referring to a letter in *The Motor Cycle* of May 2nd by "A Few M.T. Fitters, R.A.F.," I do not think any of these men have been to France. If so, can they let me know the name of any place here where M.T. fitters look after motor cycles, as they say, and are at all times responsible for their being in running order? I should like to say that all motor cyclists out here have to do all repairs but broken frames. I have had nearly two years' riding out here, and have myself done all repairs, bar frames, which are done in the motor cycle repair shop. There are only two of these, and the work is done by M.C. fitters, not M.T. J.H.

B.E.F.

THE RAID ON CUXHAVEN.

Sir,—In the issue of your paper dated April 18th you show a photograph of an Avro biplane with Monsoupape engine. Underneath the photograph is the following: "This type of machine was used in the raid on Cuxhaven in the early days of the war." As a matter of fact, Short seaplanes were used in raid on Cuxhaven, but three Avro biplanes were used in December, 1914, in the raid on Fredrickshafen. Probably Cuxhaven was a printer's error.

You may be interested to know that I joined the M.M.G.S. at Nottingham in July, 1916, and in August, 1917, I obtained a transfer to the R.F.C., and later got my commission. R.A.F.

E.E.F.

MAGNETO HAS A COLD.

Sir,—This experience may be of interest to your readers. In February last year I was on stunt for ammunition, and the journey took me through a rather large French town. The weather, I might add, was of a sort very much undesired by us D.R.'s. It was a journey of about fifty kilometres in a continual drizzle of fine rain, coupled with *beaucoup* slush and mud.

I was jogging along, feeling rather miserable, when suddenly the old W.D. Triumph gave up the ghost. I had a good look round, and found everything was A1, apart from the fact that I could not obtain a decent spark. So I removed the magneto, dismantled and cleaned it, but still it failed to give off the desired effect. This delay put me rather behind time, the motor bicycle was *na poo*, and the message not delivered. So I commandeered the first D.R. that passed to deliver the message. That done, all well and good!

Now I received a sudden brain wave, and came to the conclusion that the magneto had got a cold, or was rather damp. So I sauntered into the nearest French cottage to air it a little round a fire. The result was marvellous; it absolutely put new life into it. I returned to the machine and fitted the magneto, retimed it, etc., and the engine started first kick. PTE. H. F. MIDDLETON.

DIFFICULT STARTING.

Sir,—I read with interest "S.W.'s" letter in *The Motor Cycle* of May 23rd, *re* his B.S.A., and especially as he found it difficult to start up when the engine was cold.

I am riding a B.S.A. 4¼ h.p. sidecar combination, and at first found it difficult to start up, but now I am getting used to its little ways, and can generally get away at the first kick. My machine is a fine goer, and we have some pretty tough hills in this part of Derbyshire, as some of your readers know.

I find the front brake useless, no matter what adjustments I make. A few weeks ago I was puzzled by the "blow backs" in the carburetter whilst running fast, but it pulled A1 on a hill. I am only a novice with twelve months' experience, and I knew not the cause, but I fitted a new plug, and lo, the trouble vanished, and the good old 'bus now runs as sweetly as ever.

I agree with "S.W." that the "amount of neglect it will stand is astonishing," as I have no time whatever for looking things over. R 2531.

Tideswell.

SHOULD SIDECARS BE DETACHABLE?

Sir,—I am a great reader of *The Motor Cycle*. Your paper gives me inestimable pleasure, and passes many a weary hour. The subjects are always very interesting.

I was reading the other day an article in your issue of February 28th concerning the Sociable sidecar. There have been many articles on the same subject previously. I have very much wanted an explanation of this idea of having the chassis of a sidecar integral with the frame of the machine. I cannot see in the least what benefit is derived therefrom. Are we having a car or a motor cycle and sidecar outfit? Which is it to be? Surely, from what I have understood, the reason we have the sidecar outfit is that we can make it, as it were, either a kind of car or solo machine. We are doing away with that advantage entirely, and are gaining nothing. It is neither a car nor a sidecar outfit. The answer will most probably be, "It is much less expensive than a car." True enough; but why not have the same engine fixed to the car itself, and with a small bonnet to cover it, then, instead of having it exposed to the dust and weather conditions, it would be protected. The motor cycle trouble is such an exposed engine (which, in these new outfits, is no longer a cycle!). There is no need to have a motor cycle which cannot be ridden glued to the side. Does this new idea mean to eliminate the old detachable sidecar in time? If so, I am very sorry, and I think many others may agree with me. I wonder if these new outfits will be so popular and the sale so great as is expected after the war. I should be very glad indeed if this can be explained to me.

Aboukir, Egypt. G. B. CODLING, Lt., R.A.F.

[This letter has been much delayed, apparently by submarine.—Ed.]

BRITISH MAGNETOS.

Sir,—Please accept my thanks, as chairman of the British Ignition Apparatus Association, for the article which you gave in your issue of May 16th on the various different makes of British magnetos.

I am convinced that the united appeal has far more weight than any amount of individual booming. It shows that the magneto industry has been tackled in a large way, and that there are ample resources to take care of all the requirements of after-war trade.

At present we are only concerned with removing from the mind of the motoring world the fallacy that Bosch was the only ignition, and we wish to replace it with British.

PETER F. BENNETT.

LONG V. MEDIUM STROKE ENGINES.

Sir,—There has been a deal of controversy on the "stroke-bore ratio" question, and I am under the impression that so far as general efficiency, or, if I may so phrase it, economical power production, is concerned, engineers definitely acknowledge the superiority of the longer stroke engine, and, since its much decried introduction by my company, the practically universal increase of stroke in car and motor cycle engines—excepting where space limitation denies the advantage, as in flat twins, etc.—is abundant evidence of this.

I was pleased, however, to see the letter from Mr. B. Breslau referring to the aid of the long stroke to thermal efficiency, and without any intention of entering the argumentative lists on the subject again, I would nevertheless like to supplement Mr. Breslau's remarks *re* the value of the smaller or more compact combustion chamber of the long stroke engine.

Although heat loss varies as the ratio of surface to volume, the superficial area of the piston-swept cylinder walls exposed to the hot gases is of almost insignificant importance compared with the area of combustion space.

In order that this may clearly be understood, I would draw attention to the following:

1. Heat loss depends upon temperature difference.
2. The period of greatest thermal loss is the period of greatest pressure (or heat).
3. Conductivity of gas increases rapidly with temperature, and makes heat loss at high temperatures much greater than in simple proportion to temperature.

This being so, no very great effort of imagination is required to realise, *first*, that the most important losses are those during ignition or early combustion, as here temperature and pressure are at maximum, and losses at this period *affect the whole of the subsequent stroke*, lowering mean pressure.

Again, the surface of the combustion chamber is exposed during the *whole time* occupied by the stroke, whereas the piston-swept walls are exposed during part of the stroke only, and then to comparatively low temperatures.

Bearing this in mind, the superior thermal efficiency of the long over the short stroke engine seems obvious, the latter presenting more cooling area to the gases when their temperature and conductivity is highest, and at a period when loss affects the whole of the stroke.

It is this fact, quite apart from consideration of mechanical advantages, that accounts for the superior stroke-power and economy of the long stroke engine.

JAS. L. NORTON.

HYDROGEN FROM WATER.

Sir,—The letter on the above subject, in your issue of May 30th, was of great interest to me. I am sure the thanks of the motor cycling fraternity are due to "Pilot," who has given us the secret of a cheap and plentiful supply of fuel, and enabled us, at a most opportune time of the year, to "blind" through the somewhat harassing regulations of the Petrol Controller.

"Pilot's" Commanding Officer should be speedily approached, and requested to forbid "Pilot," in the interests of the engineering and scientific world, to make any more ascents.

He really cannot be spared to tackle such trivial problems as bagging "Huns," who, if they happened to capture him, would soon make use of his obvious genius in chemical research.

Perhaps "Pilot" will tell us, if it is not revealing trade secrets:

(1.) The make of magneto which enables him to utilise the H.T. spark, as well as shorting a considerable portion of output from primary winding through the liquid, at a voltage high enough to pass through pure water (acidulated water, of course, would spoil the nickelled fittings of his tank), and with sufficient wattage to render possible the liberation of some 350,000 c.c. per minute, at normal road speed, of free hydrogen.

(2.) When he first discovered that unidirectional electrolysis was possible with alternating current.

(3.) What device he uses to secure the escape of oxygen only from one of the electrodes coupled to magneto primary.

Barrow-in-Furness. K.A.W.

Sir,—I read with great interest a letter signed by "Pilot, R.A.F.," in your issue of May 30th *re* hydrogen as fuel for motor cycles.

It appears to me that this method of obtaining and using hydrogen is quite impossible. The energy required to split up the water must, of necessity, exactly balance that given up by the hydrogen in recombining with the oxygen in the air.

As the power used in splitting up the water comes, through the magneto, from the engine, there can be no surplus energy to overcome friction of the bearings to drive the bicycle, etc.

I should be glad to hear further details from "Pilot, R.A.F." OBSERVER.

R.N.

Sir,—May I suggest two small improvements to the system by which "Pilot, R.A.F.," runs his motor cycle on hydrogen generated from water by current from the earth terminal of his magneto?

First: Why let the oxygen escape? Why not use the perfect mixture, and so avoid the misfiring he experiences at over 15 m.p.h.?

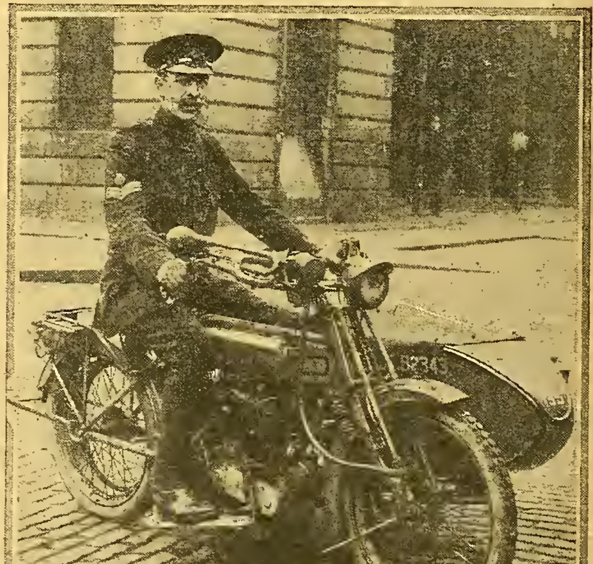
Second: Why not fit a condenser to the exhaust, and thus save the expense of filling up his tank with water?

The Radco, I believe, is fitted with an English magneto; and yet there be they who still prefer the German article!

I sincerely trust "Pilot, R.A.F.," has fully covered his idea, as I believe the patent for a good perpetual motion machine is of considerable value.

Or, Mr. Editor, is "Pilot, R.A.F.," pulling our wing?

F. STEPHENS.



Sgt.-in-charge R. M. Brice, H.Q.C.D. (A.A. Section), on his 8 h.p. Vindec sidecar combination. R. M. Brice is one of our old-time and best known motor cyclists, having competed regularly in competitions from the very earliest days of motor cycling.

Sir,—The letter in *The Motor Cycle* of May 30th by "Pilot" is very interesting, but the following queries arise :

(a.) Why is it the water does not flow into the engine *viâ* the induction pipe?

(b.) As it is necessary to use acidulated water (plain water being a very poor conductor), is the tank of earthenware or lined?

(c.) How is it possible to separate hydrogen from oxygen with an alternating current, *i.e.*, from a magneto?

(d.) Why two wires to "earth" terminal?

(e.) As hydrogen 2 parts, oxygen 1 part, by volume form an ideal explosive mixture, why allow the oxygen to escape?

(f.) As 250 c.f. gas = 1 gal. petrol, say 120 m.p.g., with 211 c.c., escape at 12 m.p.h. = 10 hours running on 250 c.f. gas = 25 c.f. gas per hour = .4 c.f. gas per minute. The usual magnetos give 4 to 6 amps. at 6 volts. What does "Pilot's" magneto give to generate .4 c.f. gas per minute?

(g.) Is "Pilot" quite sure he turned off the petrol after starting up?

I may add that I have tried this "stunt," but beyond having very bad missing in the cylinders and a few stray bubbles on wires immersed in water it was a wash-out.

ILFORDONIAN.

Sir,—We were extremely interested to see, in your issue of May 30th, the letter by "Pilot, R.A.F.," in which he describes his method of using water as a fuel. Nearly two years ago my chum and I thought out this "stunt," but as we had not the wherewithal to try it on our 'bus we had to drop it.

We wonder why your contributor allows all his oxygen to escape, when the two gases are coming over in perfect proportions all ready to his hand? Why not allow them to remix and fire them in the usual manner? There is also less fear of leakage, as no air inlet is required.

We had foreseen the difficulty of the slow evolution of the gases, and proposed to divide the tank in compartments, insulated from one another, with electrodes fitted in each, these being connected in parallel. Of course, to do this properly would really require an extra small dynamo, instead of using the magneto for this purpose and also for sparking. Perhaps this would overcome the difficulty your correspondent speaks of—that of misfiring at over 15 m.p.h.

What we have really been unable to understand is this : The exhaust from an engine running on oxygen and hydrogen is, of course, water vapour. Now if this be condensed and returned to the tank, we have perpetual motion! If any of your readers can throw any light on this phenomenon we shall be glad to hear of it.

Midlothian. TWO SCHOOLBOYS.

[We printed "Pilot's" letter exactly as received, knowing that it would cause interest and comment. At the same time, realising the improbability, not to say impossibility, of the whole affair as described, although it contains the germs of truth, we made enquiries, which have resulted in showing the letter to be simply an effort of the imagination. This most of our correspondents have been quick to perceive.—ED.]

FRAMES EMBODYING THE TANKS.

Sir,—In an article by "Vedette" on "Frames Embodying the Tanks," the writer states "that the only adaptation of this idea has been on recently designed machines," etc. I would like to contradict this, and say that a frame identical with the Premier was designed by Mr. G. Pilkington and the undersigned and constructed by the Rex Co. in 1909.

The idea, however, was considered unsightly, and was not proceeded with. It was, no doubt, like a good many other Rex productions, years before its time.

H. SARGINSON.

DIFFICULT STARTING.

Sir,—As I have seen several letters from B.S.A. riders complaining of difficult starting previously to that of "S.W." in *The Motor Cycle* for May 23rd, it strikes me that my experience may be of use to some.

Over two years ago I purchased a B.S.A. sidecar combination of the standard 4¼ h.p. type, and, a complete novice, commenced my motoring career, with nothing but a fair general knowledge of mechanics to guide me. At once the difficult starting bogey cropped up. *(a)* Starting from cold. *(b)* Starting with the engine hot after an enforced stop on the road.

(a) I had had the usual instructions which every novice receives, viz., "After priming the cylinder with a few drops of petrol, lift the exhaust valve, push the kick-starter vigorously, and when the engine is turning briskly drop the valve suddenly." Why *do* the books give this advice? It is totally wrong. It will get a start—sometimes; but oftener it will not. Many a time I sweated at the job for ten, fifteen, and twenty minutes, especially if the engine was a bit stiff. I was then indebted to a casual letter in *The Motor Cycle* for the correct way, and I have never since failed to get the machine off easily at the first or second kick, provided there was not something wrong with the magneto, such as a dirty contact. The following is the way to do it, and every driver of a single-cylinder engine should take note of it. It will save both perspiration and profanity :

(1.) Inject a little petrol through the compression tap and close tap.

(2.) Press kick-starter pedal till the compression stops you.

(3.) Lift exhaust valve, keeping just pressure enough on kick-starter to carry the piston over the top of the compression stroke, but no further.

(4.) Drop exhaust valve.

(5.) Now give the kick-starter a vigorous push. In this way the piston has to make three complete strokes before again meeting the resistance of the compression, and the flywheel has therefore a chance to get up speed enough to get over the compression. In cold weather it is well to rotate the engine a few turns with the exhaust valve up, after priming, in order to free the piston before trying to start.

(b) Now about starting *hot*. The only difficulty that can be present (if all is in order) is, in brief, *faulty mixture*. You are well primed with instructions as to the proper position of air and throttle levers for starting *cold*. But no one ever has thought of offering the novice the tip that the setting of the air lever which is quite right for a *cold* start is quite wrong for a *hot* start. You start from cold with air closed. But to start from hot you must have air open; if the cylinder is only warm, a little open; if it is very hot, wide open —as wide as the throttle. Before I discovered this simple tip, how I hated being forced to stop for shying horses, or a herd of cattle, etc. More than once I was twenty minutes getting off again. Now I do not care. I would as soon stop the engine to open a gate as declutch, for one kick will start the engine again. And I have come to the conclusion that there is no such thing as difficult starting, at least with the B.S.A., if the rider knows how. But why in the name of all that is perverse do not the books tell one these things? And, may I add, for an absolutely "no trouble" mount the B.S.A. is hard to beat when one knows the machine. In other words, troubles are due to the rider, not to the machine.

"S.W." also complains of the lubrication of the fork spindles. These certainly repay a little attention. It is a good plan to withdraw the pins occasionally, clean and oil them all over before replacing. A very little light oil in the lubricating holes will then keep them running all right.

And one more tip about the weakest point of a motor cycle, viz., the front wheel bearings. Every rider knows the bother caused by water and grit being conducted into the bearings, *viâ* the forks, in wet weather. Here is a complete cure. Cut two circular pieces from any old tin 4in. diameter. In the centre of each make a hole the size of the front hub spindle. Take the wheel off, remove nuts, and slip one of the tin circles on each end of the spindle, up against the cone. Replace the wheel with the tin discs *inside the forks*, and screw up tightly. The pressure of the nuts will cause the discs to assume a saucer shape and concave inwards. Water, etc., running down the forks cannot get inside these, nor can splashes from the tyre in front.

(REV.) WM. F. A. ELLISON.

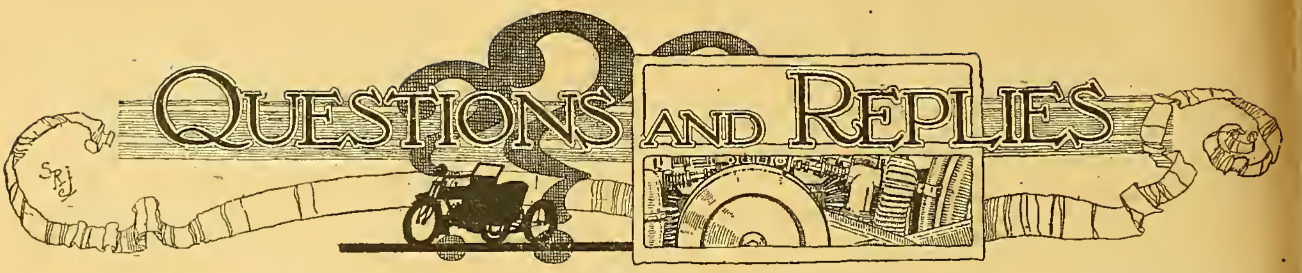
SUMMARY OF CORRESPONDENCE.

We have received the following remarks from Mr. E. B. Ware, chief engineer to Messrs. J. A. Prestwich and Co., regarding the idea for starting a Zenith-Jap illustrated in *The Motor Cycle* of May 16th :

"This arrangement would be unsatisfactory, and we should certainly not recommend it.

"(1.) The J.A.P. gear sprocket is screwed with a left-hand thread, thus any attempt at rotating the engine forward through its teeth will result in the unscrewing of the sprocket and upsetting the timing.

"(2.) The teeth of the wheels are not designed to transmit the power required to start the engine."



A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Removing Old Enamel.

I have my motor cycle in pieces, and I am anxious to re-enamel it, so will you please let me know which is the best and the easiest way to remove the old enamel?—E.R.

We should recommend you to burn the old enamel off with a blow lamp, and then scrape and sandpaper the tubes.

Faulty Flywheel Key.

I have a 1914 single-cylinder two-stroke, and recently had to remove the flywheel, and, after replacing it, I started the engine, with the result that the key split in half, leaving one piece in the keyway on the crankshaft and the other piece in the keyway on the flywheel. I have now had the flywheel rebushed as it was somewhat worn, and a new key cut. I then replaced the flywheel, taking care to drive it well up the taper, but as soon as I started the engine the key again split. Should the key be made of extra hard steel?—A.G.

Evidently the key was made of over-hardened steel. We should therefore recommend you to fit a new one, made of something rather tougher and less brittle.

Petrol for Testing.

We are motor engineers and dealers, and have taken out a trade registration for the last eight years. Supposing we advertise a machine for sale in your paper—which we do most weeks—and an intending purchaser wishes us to ride the machine over for his inspection, say a distance of fifty miles, is it perfectly legal for us to do so under the present restrictions? Also, if we purchase a machine from, say, fifty or sixty miles away, shall we be in order in riding it home? Also, supposing we have overhauled a machine, shall we be right in testing it on the road, provided we have our trade number-plates on the machine?—E.B.

The present legal position is that in connection with the *bonâ fide* sale or intended sale of a motor vehicle it can be ridden a distance of twenty miles without a permit, provided the seller has obtained the permission of the police authority of the area in which the vehicle is kept. For distances exceeding twenty miles a special permit must be obtained from the Petrol Controller. As regards testing, this is quite in order, provided you carry your trade numbers and satisfy the usual conditions.

Loss of Power.

(1.) My motor cycle engine has the exhaust valve seating cracked. It goes all right for about half a mile, and then loses power and stops. Do you think the cracked exhaust valve seating would cause the trouble? (2.) I sent the cylinder to a firm to have the crack welded, but it was returned to me with a letter stating that they could not do the work without receiving a certificate from the Ministry of Munitions. (3.) Can I get a certificate from the Ministry of Munitions to have the cylinder repaired?—G.W.

(1.) We think there is no doubt that the cracked exhaust valve seating is the cause of the trouble. (2 and 3.) A priority certificate will only be granted if the owner is doing work of national importance. Application should be made to the Ministry of Munitions, Priority Branch, Caxton House, Westminster, S.W.1.

A Burnt-out Armature.

I shall be glad of your expert advice on the following trouble with a two-stroke motor cycle. After a run of about fifty miles, and leaving the machine standing, on starting up again I found that the shellac on the armature of the magneto had melted and simply gummed up. This meant taking off the magneto cover and cleaning the armature with paraffin. Will you kindly let me know how this can be remedied, and the cause of the melting? Does this happen in all two-strokes with the magneto placed close behind the cylinder?—R.J.R., India.

The trouble which you have experienced is probably the burning out of the armature. This does not mean merely taking the magneto to pieces and cleaning the armature with paraffin, but rewinding the whole armature—a job which cannot possibly be undertaken by an amateur. Either you must send the armature back for rewinding or purchase a new one. Also when removing the armature, instantly place a piece of iron across the poles of the magneto as a keeper, otherwise you will lose all the magnetism; in fact, it would be better to send the whole magneto back to the makers of the machine or to some reputable firm in one of the large towns, such as Bombay. The trouble may have been caused by excessive heat, and we have often heard of similar trouble in the tropics. It is probable, too, that the position of the magneto has something to do with the trouble.

Suction Gas.

Will you kindly tell me if a permit is required for a suction gas apparatus for a motor cycle, and if such an apparatus is on the market?—F.L.

Since "gas" means any form of gas capable of being used for the purpose of driving internal combustion engines, suction gas would come under this category, and would be forbidden to be used except for the purposes mentioned in the Motor Spirit (Consolidation) and Gas Restriction Order, 1918.

Petrol Permits for Munition Workers.

I have tried in vain to obtain a petrol permit. My case is that of a foreman in a munitions factory, and I have to work unusual hours. I cannot use the method of conveyance provided for the other employees because our leaving times do not coincide. I have to walk one mile to the nearest tram service, the journey takes one hour, and I can do the whole journey on a motor cycle in fifteen minutes. You will see I should save threequarters of an hour each way, which is a consideration in these very strenuous times. I have always used a motor cycle for work, and now when I have really more work than ever to do I find it more difficult to get to work and with less time for rest.—M.R.V.

You might try putting your case before the secretary of the National Motor Cyclists' Fuel Union, 70, Abingdon Street, Derby, but we do not think you have much prospect of success. If a tram will take you to within one mile of your work, you may not be regarded by the Controller as deserving of a permit.

READER'S REPLY.

Flywheel out of Truth.

On May 30th "C.S." complains that the flywheel of his 1913 Douglas is out of truth on assembling. With most Douglases the flywheel fits very tightly to the crankshaft, owing to a slight cone. It is usually very difficult to take the flywheel off, and without an extractor the usual method of tapping the crankshaft is useless until the taps become hard knocks. This nearly always results in bending the crankshaft. The remedy is a new crankshaft unless the old one can be straightened. If the flywheel has worked loose, the centre and keyway will be damaged also, and this necessitates a new flywheel.—R.E.C.

A Post-War Feature of the

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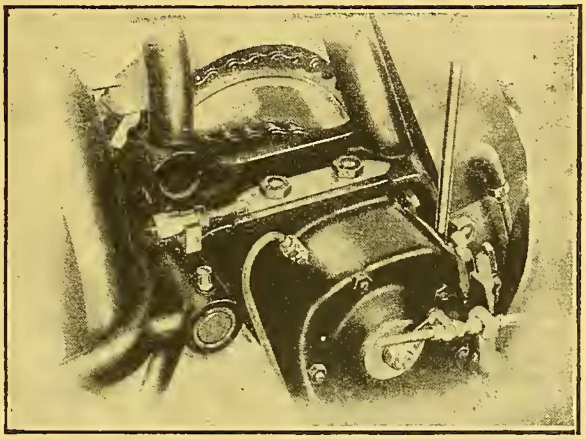

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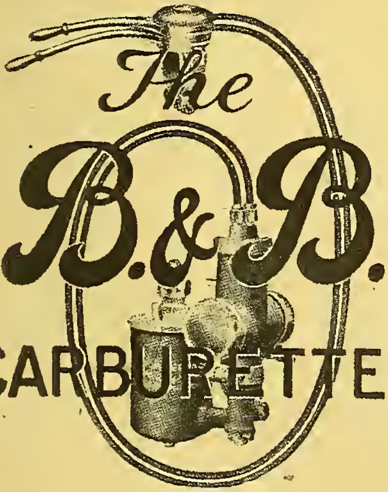

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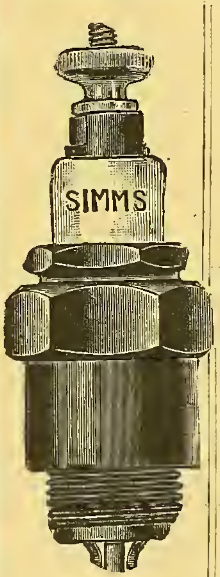

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which fires perfectly, and does not soot up.

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E.I.H.

Order "The Motor Cycle" before JUNE 24

Owing to the Government order prohibiting "returns," newsagents will no longer be able to cater for chance buyers. The only way to ensure getting copies regularly is to **GIVE A DEFINITE ORDER.**

FOR some time past we have been urging upon readers the importance of placing a definite order, either with a newsagent or direct to ourselves, for a regular supply of "THE MOTOR CYCLE," the reason for this being that in view of the paper shortage all chance buying—which leads to copies being left unsold and possibly wasted—must be discontinued.

An official order—which comes into force on June 24th—has now been issued by the Controller of Paper, prohibiting the system of supplying newspapers and periodicals "on sale or return."

In the past it has been the custom with publishers to allow newsagents to return unsold copies, and this enabled them to provide for the requirements o travellers and other chance buyers.

The new Order prohibits this custom, and, consequently, the newsagents, being unable to return unsold copies, obviously cannot be expected to run the risk of having copies left on their hands, and in future they will take only sufficient to supply definite orders.

To avoid the disappointment of being unable to obtain "The Motor Cycle," each reader, who has not yet given a standing order, should at once ask his newsagent to reserve or deliver a copy weekly, or, if preferred, a direct subscription may be placed with the publishers.

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ll letters relating to advertisements should te the number which is printed at the end of advertisement, and the date of the issue which it appeared.

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r the convenience of advertisers, letters may be essed to numbers at "The Motor Cycle" Office. n this is desired, the sum of 6d. to defray the cost of tration and to cover postage on replies must be added e advertisement charge. Only the number will appear e advertisement. All replies should be addressed . 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

rsons who hesitate to send money to unknown persons deal in perfect safety by availing themselves of our sit System. If the money be deposited with "The r Cycle," both parties are advised of this receipt.

e time allowed for a decision after receipt of the s is three days, and if a sale is effected we remit the nt to the seller. but if not we return the amount e depositor, and each party to the transaction pays ge one way. For all transactions exceeding £10 in , a deposit fee of 2s. 6d. is charged: when under he fee is 1s. All deposit matters are dealt with at ntry, and cheques and money orders should be made ble to Iliffe & Sons Limited.

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SPECIAL NOTE.

Readers who reply to advertisements and receive no er to their enquiries are requested to regard the e as an indication that the goods advertised have dy been disposed of. Advertisers often receive so enquiries that it is quite impossible to reply to each by post.

MOTOR CYCLES FOR SALE.

Abingdon.

INGDON-KING Dick, 3½h.p., 2-speed, hand clutch, speedometer, etc.; great bargain, £16/10.—25, ford Rd., Acton. [5929

R Sale, a great bargain, 1912 4h.p. Abingdon-King Dick, in perfect running order; one 2¼h.p. Ariel, condition, needs slight adjustment; one 1916 3½ Premier and sidecar (less cylinder), 3-speed gear, start, etc.; £40 the lot.—Box 2,015, c/o *The Motor*. [5932

A.J.S.

15 A.J.S., 2¾h.p., 3 speeds, complete; £41.—Cross, Effingham Sq., Rotherham. [X5242

OW Bros., Guildford, A.J.S. agents since 1912, always have dependable second-hand machines. [5369

J.S. 1916 6h.p. Combination, Lucas dynamo and lamps, spring seat, spare wheel, very smart; 10.—Farrar.

J.S. 1915 6h.p. Combination, spare wheel, Lucas lamps, Cowey speedometer, extra smart; £87/10.—ar.

OTOR Cycle, 6h.p. 1915 A.J.S., with sidecar, in perfect order, tyres new; £60 cash.—Box L6,398, *The Motor Cycle*. [5926

J.S. 6h.p. Combinations.—We have five in stock. If you wish to buy, sell, or exchange your A.J.S., e us.—Farrar's Motors, Hopwood Lane, Halifax. [5922

IF IN NEED OF A Motor Cycle or Combination

EITHER FOR

WAR WORK or BUSINESS PURPOSES,

WRITE TO

GODFREY'S LTD.

They can supply you from stock, and you can rely on getting value for your money.

SEND FOR FULL LIST OF NEW AND SECOND-HAND MACHINES.

EASY TERMS.

GODFREY'S LTD.

208, Gt. Portland Street, LONDON, W.1.

'PHONE: 7091 MAYFAIR (2 Lines).

You would not take your watch to a Blacksmith for repair—

neither should you take your

DIXIE OR SPLITDORF MAGNETO

for repairs or spares elsewhere than to the direct factory representatives:

American Supplies Co. Ltd.

DI-XI-E

162 Grt. Portland Street, LONDON. W.1

'Phone: Mayfair 3256

CLEAN ALUMINIUM, BRASS, and GUNMETAL

CASTINGS

For AIRCRAFT, MOTORS, and MOTOR CYCLES

SAMUEL F. ROGERS

(Metallurgical Chemists & Metalographists),

CALEDONIAN WORKS, PRINCE'S END, TIPTON.

DEFENCE OF THE REALM ACT

Under the provisions of the above Act, advertisers requiring workmen, and whose business consists wholly or mainly of engineering or the productions of munitions of war, or substances required for the production thereof, and whose works are situated within 30 miles of London, must include in every such advertisement the words, "No person resident more than 10 miles away, or already engaged on Government work, will be engaged."

Advertisers whose works are situated more than 30 miles from London can only have their announcements inserted with the approval of the Board of Trade, who will allocate to each advertisement a box number, and collect and distribute to the advertiser all replies received. The necessary forms of application can be obtained from any Labour Exchange or from the offices of this paper, and each advertisement must contain a clear reference to the effect that no person already engaged on Government work need apply.

MOTOR CYCLES FOR SALE.

A.J.S.

A.J.S. 1916 4h.p. Twin, 3 speeds, dropped frame, kick start, lamps, and horn, condition as new, and guaranteed; £67.—Below.

A.J.S. 1915 2¾h.p., 2 speeds, dropped frame, kick starter and clutch, all accessories, and ready for the road, guaranteed; £46.—Maudes', 100, Gt. Portland St., London, W.1. [5913

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—1915 A.J.S., 2¾h.p., 2-speed, clutch, kick start; 39 gns. [5798

A.J.S. Motor Cycles.—Delivery from stock of the Military Model, 6h.p.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0491

A.J.S.—Immediate delivery of Military Model, 700×80 tyres, detachable wheels; £91/6.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

A.J.S. 1916 4h.p. Combination, disc wheels, Lucas lighting, hood, screen, and mechanical horn, equal to new; £97/10.—F. L. Harris, 24, Mount St., Walsall. [X5213

4h.p. 1916 A.J.S. Twin, latest chain drive, hand controlled clutch, lamps, horn, speedometer, perfect condition, very low mileage; £65.—Robinson's Garage, Green St., Cambridge. [5911

A.J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; £91/6; no permits required.—P. J. Evans, sole agent for Birmingham and district, 87-91, John Bright St., Birmingham. [5675

A.J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [4987

Alldays.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Allon, 1916, 2-speed, 2-stroke, perfect, 29 gns.; Allon, 1917, 2-speed, 2-stroke, ridden 800 miles, 35 gns. [5799

ALLON, 2¾h.p., brand new, 2-stroke, never been on the road, and guaranteed; reduced price £32.—Maudes' Motor Mart, 100, Gt. Portland St., London, W.1. Tel.: 552 Mayfair. [5572

Ariel.

CROW Bros., Guildford, Ariel agents.—New and overhauled second-hand models in stock. [5370

LATE 1914 3½h.p. Ariel, 3-speed countershaft, decompressor, kick starter; bargain, £26.—Clapham (Motors), King George St., Greenwich. [X5073

ARIEL, late 1913, 3½h.p., 3-speed, and 1917 coachbuilt sidecar, decked in, unused during 1915 till Nov., 1916, engine guaranteed perfect order, take any hill, tyres only 6 months used; £35; speedometer, mechanical.—Box 2,007, c/o *The Motor Cycle*. [X5164

Auto-Wheels.

GENUINE Wall Auto-Wheel, very little used, splendid condition, complete; £8/10.—Murray, 37a, Charles St., Hatton Garden, Holborn. [X5230

Blackburne.

1914 Blackburne, 3½h.p., 3-speed, kick starter, hub model Sturmey, roomy coachbuilt sidecar, Lucas lamps, horn, generators, good condition, tyres practically new, spares; £40.—Sydenham, Rowledge, Surrey. [5912

Bat.

BAT 6h.p. Twin, 2-speed countershaft gear, J.A.P. engine, round tank, solo machine, but would take sidecar; price £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5897

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Bat.

BAT Road Racer, 7-9h.p. J.A.P. engine, overhead valves, very powerful engine; £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5896

Bradbury.

BRADBURY, 1914, 6h.p., and sidecar, £55; 1912-1913 3½h.p., 3 speeds, with coach sidecar, £32 10; 1913 3½h.p., 3-speed model, £29.10.—Motor Exchange, Horton St., Halifax. [5849

Brough.

BROUGH for disposal, 1913, 4h.p., single-cyl., free engine, condition good, tyres as new, £24; also Bosch magneto, single, ZE1, guaranteed, £3.—38, Britannia Rd., Bedford. [5931

Brown

BROWN, 3½h.p., U.H. mag., low built, splendid order throughout; £10 10; appointment.—Speechley, 25, Strafford Rd., Acton. [5928

B.S.A.

B.S.A., 1916, 4¼h.p., 3 speeds, in nice condition; £55.—Percy and Co., 337, Euston Rd., London. [5943

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—B.S.A., 1913, 3½h.p., 2-speed, clutch, pedal starter; 25 gns. [5801

B.S.A. Combination, 1915, 4¼h.p., 3-speed, chain-cum-belt, condition as new; £50.—Smith, 16, Haverstock Hill, opposite Chalk Farm Tube Station. [5865

1916 Model B.S.A., 4¼h.p., 3-speed, free engine, kick starter, Canoelet sidecar, very little used, equal to new.—28, Westville Rd., Thames Ditton. [5882

1916 B.S.A. and Millford sidecar, 4¼h.p., chain-cum-belt, lamps, horn, sound condition throughout; £55.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0479

B.S.A., 1916, 4¼h.p., and coachbuilt sidecar, 3-speed countershaft, chain-cum-belt, kick start, with accessories, little used, excellent condition; will accept reasonable offer.—Particulars, 54, Goldcroft, Yeovil. [5765

1917 B.S.A. 4¼h.p. Big Single, 3-speed countershaft gear, free engine, and kick starter, includes accessories, £57/10; also a 1916 model, same specifications, £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5898

B.S.A. Motor Cycle, practically new, 3-speed, 1916 model, fitted with sidecar, shock absorbers, speedometer, Powell and Hanmer head lights, Dunlop extra heavy tyres; £85, no offers.—Caversham Motors, Ltd., Reading. [5763

Calthorpe.

CALTHORPE Lightweight, 2½h.p. J.A.P., 2-speed gear; £24.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3523

1916 2¼h.p. Calthorpe-Jap, Enfield 2-speed and clutch, as new, run 600 miles; £24/10.—Durham, 4, Hunter Rd., Ilford. [5891

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [5677

BARGAIN.—1916 Calthorpe-Jap, 2¾h.p., 2-speed model, fully equipped, and unused for 12 months; £25.—Captain Edwards, 89, Wigmore St., London, W.1. Mayfair 283. [5772

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Calthorpe-Jap, 1915, 2¾h.p., 2-speed, clutch, renovated, 24 gns.; another, 22 gns.; Calthorpe, 1915, 2-speed, 2-stroke, 23 gns. [5802

2¼h.p. Calthorpe, 2-stroke 2-speed model, but little used, includes accessories, £22/10; also two new models, one single speed with J.A.P. engine £32, another 2-speed J.A.P. engine £39/18.—Wauchope's, 9, Shoe Lane, London. [5892

Campion.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Campion, 1916, 2-stroke, 2-speed, 24 gns.; Campion-Jap, 1915, 3½h.p., Jardine 2-speed gear box, all chain drive, new condition, 36 gns. [5803

Chater-Lea-Jap.

CHATER-LEA Combination, 6h.p. twin J.A.P. engine, countershaft gear, Phœnix S.C., perfect throughout; bargain, £45.—Pritchett, Allbrook, Eastleigh. [5764

Coventry Eagle.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Coventry Eagle, 1916, 2-speed, 2-stroke, re-enamelled and replated; 29 gns. [5804

Clyno.

2½h.p. Clyno, 2-stroke model, reliable, speedy; £22/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5893

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Clyno, 1916, 2-speed, 2-stroke, hand clutch, re-enamelled and replated; 27 gns. [5805

1913 Clyno, 3-speed gear box, kick start, with detachable wheels, Millford Empress 1915 sidecar, Bosch mag.; £45.—Mason's Garage, Letchworth. [5871

Douglas.

DOUGLAS, 1914, 2¾h.p., 2-speed; £30.—Armstrong, Dale St., Haltwhistle. [X5190

1915 2¾h.p. Douglas, complete lamps, horn, etc.; £40.—Cross, Jeweller, Rotherham. [X5241

SPECIAL OFFER THIS WEEK.

LEVIS, 2½ h.p., latest model. This machine, which is fitted with a more powerful engine than the Popular Levis, is a most efficient mount. Our special price **35 Gns.** only.

Also the following in Stock:

New Machines. Latest Models.

NEW HUDSON and Sidecar, 3½-4 h.p.	**£86 12 6**
LEVIS POPULAR, 2-stroke	**£32 0 0**
LEVIS, 2½ h.p., 2-speed....	**£47 10 0**
NEW IMPERIAL - J.A.P., 2½ h.p.	**44 Gns.**
ROVER, W.O. model, 5-6 h.p. J.A.P.	**£97 10 0**
ROVER, W.O. model, and Sidecar	**£124 5 0**
ROVER, 3-speed clutch....	**£80 0 0**
ROVER, T.T., Philipson ..	**£67 10 0**
ROVER, 3-speed, not done 2,000 miles	**50 Gns.**
ROVER, T.T., absolutely equal to new..........	**45 Gns.**

JULIAN, **84, Broad St., —READING.—**

Biggest Light Car and Motor Cycle Dealer in the South.

'Phone: 1024. Closed Wednesdays 1.

MOTOR CYCLES FOR SALE.

Douglas.

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

1914 2¾h.p. 2-speed Douglas, perfect condition, accessories; genuine; £32.—Campbell, Buntingford. [X5215

DOUGLAS, 1915, 2¾h.p., 2-speed, new condition, all accessories.—Shillan, 37, Atherton Rd., Forest Gate. [5797

1915 Douglas, 2¾h.p., 2-speed, T.T., new tyres and controls, and all accessories; £37.—Payne, Wayside, Ruislip. [X5762

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50. [5955

DOUGLAS 2¾h.p., 2-speed, kick starter, horn, tyres good, thoroughly overhauled; £33; approval.—Gibb, Douglas Expert, Gloucester. [X5075

3½h.p. Douglas, 1914 model, 2 speeds, suitable for solo riding or with sidecar; bargain at £40.—Wauchope's, 9, Shoe Lane, London. [5894

DOUGLAS, late 1913, T.T., 2-speed model, fully equipped, several accessories, condition nearly equal to new; £32.—Albert E. Deans, Baldock. [5689

DOUGLAS Motor Cycles.—We can supply by return 1918 models on receipt of permit.—Eli Clark, the Douglas agent, 196, Cheltenham Rd., Bristol. [0923

DOUGLAS, 2¾h.p., 1914 V. Model, in 1917 condition, practically as new, accessories; 40 gns., no offers; appointment only.—Blackburn, 37, Boundary Rd., Walthamstow. [5787

DOUGLAS 1915 4h.p. Combination, 3 speeds, kick start, all accessories, £60; 1914 2¾h.p. Douglas, all accessories, including speedometer, splendid condition, £35.—Maudes', 100, Gt. Portland St., London, W.1. [5736

LATE 1913 Douglas, 2¾h.p., 2-speed, speedometer, good tyres, new mudguards, acetylene lamps, excellent condition, Empire lightweight sidecar; £40 lot, or exchange 4¼h.p. solo.—Jones, 212, Upper Thames St., London. [5760

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1915 2-speed Douglas, £39/10; 1914 2-speed model, £34/10; 1913 2-speed, £31/10.—Motor Exchange, Horton St., Halifax. [5850

1916 2¾h.p. Douglas Model U, touring bars, footboards, 2-speed gear, Hutchinson tyres, Amac carburetter, Thomson-Bennett magneto, B170 saddle, few miles only, perfect condition; £52/10.—Robinson's Garage, Green St., Cambridge. [5910

MOTOR CYCLES FOR SALE.

Douglas.

1912 2¾h.p. Douglas, 2-cyl., clutch, Bowdea trols, 2 speeds, excellent condition, tyres g Carleton and Tulloch, 15a, Down St., Piccadilly 'Phone: Mayfair 1037.

1917 4h.p. Models A. and B. Douglas, 2¾h.p. W., also U. and V. models, 1916 specifica absolutely new; immediate delivery against Priority mit for doctors, farmers, war and munition work How and where to apply, full particulars, write D Specialists, Robinson's Garage, Green St., Camb

RIDER TROWARD and Co., 31 and 40b, Hig Hampstead.—Douglas, 1915, 2¾h.p., 2-speed enamelled and replated, 42 gns.; Douglas, 1916, Colonial Model, 3-speed, T.T., fine condition, 59 Douglas, 1913, 2¾h.p., 2-speed, clutch, kick star gns.; Douglas, 1913, T.T., 2-speed, 27 gns.; Do 1911, 2-speed, 29 gns.; Douglas, 1911, single 14 gns.

Enfield.

1916 Enfield Combination, 6h.p., screen, horn, good condition; £75.—Below.

1915 Enfield, 3h.p., 2-speed, lamps, horn; £ Elce and Co., 15-16, Bishopsgate Av., Cam St., E.C.3.

ENFIELD, 3h.p., as new; £55; exchange for condition immaterial if late model.—15, Liste Hull. [X

ENFIELD 3h.p. Twin, 66 gns.; touring and models in stock.—Exeter Motor Cycle Co., Bath Rd., Exeter.

ENFIELD, 1915, 6h.p., 2-speed coach combin in fine order, £72/10; 1916 model, £82/10.— Exchange, Horton St., Halifax.

ENFIELD, 1915, 3h.p., 2-speed, kick start, c new tyres, Lucas horn, Stewart speedometer, P seat, big end rebushed; photo; carriage paid £ Finchett, 37, Cheltenham St., Barrow. [X

RIDER TROWARD and Co., 31 and 40b, High Hampstead.—Enfield, 1916 Colonial Model bination, 69 gns.; Enfield 1916 standard model bination, 66 gns.; Enfield, 1916, 3h.p., 2-speed, as 42 gns.; ditto, 1915, 32 gns.

6h.p. Enfield Combination, including accessories, superior machine, kept well, and in prime c tion, mechanically sound as new, 80 gns.; also a model combination, coach sidecar, £55; and a l £35, cane seat.—Wauchope's, 9, Shoe Lane, Lo

Excelsior.

EXCELSIOR, 7-9h.p. twin, 1914, Bosch, in order; bargain, £30.—Alpe, 54, Coval Rd., lake, S.W. [X

RIDER TROWARD and Co., 31 and 40b, High Hampstead.—British Excelsior, 2-speed, 2-st 1916; 25 gns.

RIDER TROWARD and Co., 31 and 40b, High Hampstead.—1917 American Excelsior com tion, as new; 85 gns.

AMERICAN 7-9h.p. Excelsior, 1916½, 3-speed, and foot clutch, very fast; bargain, £43; sell.—Box 2,013, c/o *The Motor Cycle.* [X5

EXCELSIOR, 8h.p., 1916, 3 speeds, kick original Goodyear tyres, lamps, etc., like new; —Maudes', 100, Gt. Portland St., London, W.1.

F.N.

RIDER TROWARD and Co., 31 and 40b, High Hampstead.—F.N., 1913, 5-6h.p., 2-speed; 29

F.N., 2½h.p., mag., 2 speeds, countershaft; gift, gns.—Wandsworth Motor Exchange Ebner Wandsworth (Town Station). [5

Harley-Davidson.

1916 Harley-Davidson, with Harley sidecar and cessories; £82/10.—Motor Exchange, Horton Halifax. [5

1916 7-9h.p. Harley-Davidson Combination, pra cally new; 70 gns.; everything complete.—M 62, Hampstead Rd., N.W. [5

HARLEY-DAVIDSON Combination, 7-9h.p., 1917, latest olive green all-electric model, a m nificent turnout, scarcely used, only done 200 miles as new throughout; accept £110.—Harley, 34, Vitt St., Smethwick, Birmingham. [X5

HARLEY-DAVIDSON 1917 (genuine) 7-9h.p. C bination, electric, complete with Millford 2-se sidecar with 2 screens, speedometer, all lamps and h guaranteed not to have done 750 miles, and like n £115.—Maudes', 100, Gt. Portland St., London, W.1 [5

Humber.

2¾h.p. Humber, twin, T.T. model, 1914 overha and decarbonised.—Sub-Lt. Ball, Carlton, L Sutton. [X5

RIDER TROWARD and Co., 31 and 40b, High Hampstead.—Immediate delivery new 3½h.p. twin Humber, 3-speed; £75; no permit required. [5

Indian.

INDIAN, 5-6h.p., Oct., 1916, 3-speed, clutch, starter, disc wheels, thoroughly overhauled and up by Hendee Co., London, like new, not ridden si bargain, £50.—Pryor, Oakamoor, Staffs. [X5

IOTOR CYCLES FOR SALE.

Indian.

N Powerplus Combination, 1916, electric equip- nt, perfect; £85.—Below.

N Powerplus Combination, 1916, in real good ndition; £75.—Below.

N, 1914 T.T., in nice condition; £32.—Percy d Co., 337, Euston Rd., London. [5948

5h.p. Red Indian, T.T. model, 3-speed, clutch; 8 gns.—Railway Garage, Staines. [5771

N 1916 2-stroke Lightweight, 3 speeds, and k start, chain drive, original tyres, all acces- bargain, £22.—Below.

N, 1915, 7-9h.p., clutch model, T.T. roadster, ry fast, and has been carefully used, all acces- £26.—Maudes', 100, Gt. Portland St., London, [5916

AN Combination, 1915, 7-9h.p., 3-speed, hood d screen, electric light, like new; £70.—5, Rich- Park Rd., Kingston, Surrey. [5889

AN, 7-9h.p., free engine, twin, £23/10; 1914 9h.p., 2 speeds, spring frame, Millford sidecar, .—Motor Exchange, Horton St., Halifax. [5853

Indian and Sidecar, 5h.p., 3-speed, clutch, kick starter, good condition, 2,000 miles; seen ointment; £45.—Bucknell, 134, Regent's Park .W.1. 'Phone: 6900 Hamp. [5874

(genuine) Red Indian, 5h.p. twin, mag., 3 speeds, clutch, kick, beautiful condition; only 42 gns.; ges entertained.—Wandsworth Motor Exchange, St., Wandsworth (Town Station). [5935

ER TROWARD and Co., 31 and 40b, High St., ampstead.—Indian, 1916, T.T., 7-9h.p., clutch, heels, as new, 48 gns.; ditto, 1915, re-enamelled plated, 42 gns.; ditto, 1915, standard, 37 gns.; 1915, 5h.p., 3-speed, 39 gns.; Indian, 1914, 7-9 T.T., clutch, 29 gns.; Indian, 1914, 7-9h.p., 2- spring frame, 36 gns.; Indian, 1914 7-9h.p. uilt combination, 48 gns.; also many Indian parts veral sidecars.—'Phone: Hampstead 5392. [5810

Ivy.

ER TROWARD and Co., 31 and 40b, High St., ampstead.—Ivy-Precision, 1915, 4¼h.p., 3-speed, 1 gns. [5811

James.

ES 3-speed Combination, 1914-5; £40.—Lieut. ackson, 94, Streatham High Rd., S.W. [5876

ER TROWARD and Co., 31 and 40b, High St., Hampstead.—James, 1914, 4¼h.p., 3-speed, big 35 gns. [5813

J.H.

ER TROWARD and Co., 31 and 40b, High St., ampstead.—J.H., 1916-17, 8h.p. M.A.G., Mills- d sidecar, hood, screen, Sturmey countershaft 85 gns. [5812

Kerry.

ER TROWARD and Co., 31 and 40b, High St., Hampstead.—Kerry-Abingdon, 1914, 4h.p., T.T., order; 24 gns. [5814

Levis.

IS 2-stroke, in real good order; £15/10.—Percy nd Co., 337, Euston Rd., London. [5942

IS 2¼h.p. Popular Model, 1916, lamps, foot- oards, stands, and all accessories, nearly new, in condition; £21/10.—Barrett, 54, Lincoln Rd., rs End. [X5076

IS, 2½h.p., 2-speed, chain drive, 12 gn. coach idecar, P. and H. lamps, horn, mirror, grips, nation not run 100 miles; £55 nett.—Vaughan, Lane, Featherstone. [5777

Lugton.

TON, 1915, 3½h.p. Precision engine, Saxon spring orks, hardly had any use, and as new; bargain, Maudes', 100, Gt. Portland St., London, W.1. [5914

Lincoln-Elk.

COLN-ELK Motor Cycle for sale, Bosch mag., amps, etc.; £8.—Box L6,392, c/o *The Motor Cycle.* [5792

ER TROWARD and Co., 31 and 40b, High St., Hampstead.—Lincoln-Elk, 1913, 3½h.p., variable 19 gns. [5815

COLN-ELK, 1914, 6h.p., countershaft gear, belt nd chain drive, underslung coach sidecar; £45.— Exchange, Horton St., Halifax. [5854

Matchless.

TCHLESS Combination.—Delivery from stock of he new 8h.p. M.A.G. model.—Elce and Co., 15- ishopsgate Av., Camomile St., E.C.3. [0481

ER TROWARD and Co., 31 and 40b, High St., Hampstead.—Early delivery of the new Matchless nation; £125, complete; no permit required. [5843

TCHLESS.—Delivery from actual stock of M.A.G. and J.A.P. engined models; exchanges if desired. ides', 100, Gt. Portland St., London, W.1. [5576 [3523

TCHLESS 1918 Combination, indistinguishable from new, M.A.G. engine, enclosed chain driven, 4 able wheels; £100.—Percy and Co., 337, Euston London. [5939

ER TROWARD and Co., 31 and 40b, High St., Hampstead.—Matchless 1915 8h.p. J.A.P. coach- combination, 3-speed, 59 gns.; Matchless 1913 J.A.P. coachbuilt combination, 2-speed, 35 gns. [5817

'KING DICK'

WELL and truly made from forged steel, "King Dick" Spanners grip "fair and square." They cannot burr a nut when properly adjusted. Famous for 35 years: guaranteed for ever. Four sizes, 3in. to 9in.

See that your spanner is stamped with the Bulldog mark here shown—the mark of the genuine "King Dick.'

Orders dealt with as Government requirements permit.

ABINGDON-ECCO, LTD.
Abingdon Works, Tyseley,
Birmingham.

London: G. H. Smith, 12, Mortimer Street, W.1.

Godbolds.

MOTOR CYCLES FOR SALE.

Matchless.

7-9h.p. Matchless, M.A.G. twin-cyl. engine, 3-speed countershaft model, free engine and kick starter, all-chain drive transmission, fitted with handsome sporting coachbuilt sidecar, includes accessories; £75; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5901

£72, lowest.—Matchless 7-9h.p. 3-speed combination, cost £115 in August, 1915, practically unused for two years, splendid condition, Watford speedometer, complete lighting set, spare tube, etc.; expert examination invited; dismantled for inspection if required; North London.—Write Box L6,399, c/o *The Motor Cycle.* [5927

M.A.G. Engined Matchless Combination, 1914, not used since 1915, splendid condition; any examination; spare tubes and covers, Lucas lamps and generators, specially fitted horn, clock, waterproof coat and leggings, fit for any work at once; nearest to £60.—C. Warren, Tamar Villa, Church Rd., Leatherhead, Surrey. [5866.

Motosacoche.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Motosacoche, 1916, 3½h.p. twin M.A.G. engine, Enfield gears, clutch, and kick start, De Lissa air-cooled exhaust valves, as new throughout, 42 gns.; ditto, 1914 model, good order, 29 gns. [5816

New Hudson.

NEW Hudson, 3½h.p., 3-speed, and new coach sidecar; £32/10.—Motor Exchange, Horton St., Halifax. [5855

NEW Hudson, 2¼h.p. J.A.P., 3 speeds, in real good order; £16.—Percy and Co., 337, Euston Rd., London. [5945

4h.p. New Hudson, clutch model, 3-speed gear, J.A.P. engine, Bosch mag., perfect going order; £22, or near offer.—Pattullo, Higgs and Co., Lower Orpington. [5464

3½h.p. New Hudson, 1914-15, 3 speeds, clutch, Bosch, with sidecar, and extra new tyre, lamps, in excellent condition; £45.—Address, Fordham, London House, Puckeridge, Herts. [5868

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—New Hudson 1915 big six 3-speed coachbuilt combination, 52 gns.; New Hudson 1914 big six 3-speed coachbuilt combination, 45 gns.; New Hudson, 1916, 2-speed, 2-stroke, renovated throughout, 29 gns. [5818

New Imperial.

CROW Bros., Guildford.—New Imperial, all models, new and second-hand, in stock. [5371

MOTOR CYCLES FOR SALE.

New Imperial.

NEW Imperial-Jap, 8h.p., 3-speed military combination in stock; 109 gns.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3521

NEW Imperial-Jap, 8h.p., 3-speed War Model combination; 109 gns.; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3521

NEW Imperial, 4¼h.p., N.S.U. speed, Bosch mag., just overhauled, splendid condition; owner joined up; £23.—A., 211, Hatfield Rd., St. Albans. [5786

NEW Imperial Motor Cycles, 2 speeds, clutch and kick starter, and lady's models in stock for immediate delivery; trade supplied; no permits required. —P. J. Evans, 91, John Bright St., Birmingham. [5678

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—New Imperial, 1916, 2-speed J.A.P., as new, 29 gns.; ditto, 1915, 24 gns.; both the above machines have been re-enamelled and replated throughout. [5821

Norton.

NORTON Big Four, all chain drive; £82/10; in stock. —Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3524

3½h.p. 1915 T.T. Norton, powerful engine; lowest price 40 gns.—Wauchope's, 9, Shoe Lane, London. [5902

BIG Four Norton, 1916, equipped with lamps, horn, splendid condition throughout; £68.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0598

NORTON, 3-speed, clutch, fast, flexible, quiet; first £26 secures; snip; coachbuilt sidecar if required. —Clapham (Motors), King George St., Greenwich. [X5074

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Immediate delivery of the new 1918 Military Model Norton, 4h.p., Sturmey countershaft gears, chain drive; £82/10. [5819

N.U.T.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—N.U.T.-J.A.P., 1915, 3½h.p. twin, o.h.v., T.T., very fast; 35 gns [5822

P. and M.

P.M., 1913, 2-speed, kick starter, in fine order, T.T. bars, lamps, horn, spares, chains, tube, etc.; £25, or sensible exchange.—Davis, 43, Shern Hall St., Walthamstow, E.17. [5775

Pierce.

PIERCE, 4-cyl., 2-speed, clutch, perfect condition; what offers?—Baets, 10, King's Rd., Richmond. [5776

N.S.U.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—N.S.U. 1913 3h.p. twin, 2-speed, clutch, attractive lightweight; 19 gns. [5820

HAVING Acquired the entire stock-in-trade of the N.S.U. Motor Co., Ltd., we can supply spares for practically all types of N.S.U. motor cycles. In ordering it is important to submit old parts as patterns.—Eagles and Co., Acton Hill Works, Acton, W.3. [0739

O.K.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—O.K.-J.A.P., 1916, 2½h.p., 2-speed, hand clutch, 26 gns.; O.K.-Precision, 1914, 3½h.p., T.T., good order, 19 gns. [5823

Precision.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Precision, 1914, 4h.p., T.T., good order; 19 gns. [5825

Premier.

PREMIER 3-speed Countershaft Combination, like new, 1915; £48.—Peck, 10, Thornbury Rd., Clapham Park, S.W.2. [5875

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Premier, 1913, 3½h.p., 2-speed, clutch, 24 gns.; Premier, 1915, 2½h.p., clutch model lightweight, 23 gns.; Premier, 1913, 3½h.p., 3-speed combination, 29 gns.; Premier, 1914, 3½h.p., 2-speed countershaft 29 gns.; Premier, 1914, 3½h.p., 3-speed coachbuilt combination, 35 gns.; Premier, 1915, 3½h.p., 3-speed, Canoelet sidecar, 45 gns. [5824

Quadrant.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Quadrant, 1913, 3½h.p., 3-speed; 24 gns. [5826

Radco.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Radco, 1915, 2½h.p., 2-stroke; 17 gns. [5829

Rex.

REX 3¼h.p., accumulator ignition; 75/-.—77, Acre Lane, S.W.2. [5925

REX, 3½h.p. Tourist, £12/10; 2-speed twin, £18/10; Rex 6h.p. twin, m.o.v., £14/10; 1913 2-speed, 6 h.p. Sidette, £36.—Motor Exchange, Horton St., Halifax. [5857

6h.p. Rex Motor Bicycle, with sidecar fittings, for sale, property of an officer, new condition; only genuine applicants need apply.—Roy, Angel Hotel, Worcester. [X4985

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Rex, 1915, 8h.p., T.T., clutch, handle start, 29 gns.; Rex 1914 8h.p. 2-speed combination, 27 gns. [5828

MOTOR CYCLES FOR SALE.

Rex.

REX 5-6h.p. Combination, 1914; £45; splendid condition.—Olive House, Thornbury Rd., Clapham Park, S.W.2. [5877

6h.p. Twin Rex, Bosch mag., spring forks, free engine, 2 speeds, m.o. valves, good tyres and belt, perfect order, splendid condition; £15, genuine bargain. —Box 2,011, c/o *The Motor Cycle.* [X5219

Rover.

ROVER Combination, 1918, run 400 miles, indistinguishable from new; £90.—Below.

ROVER Combination, 1917, in exceptional nice condition throughout; £70; both fully equipped, speedometers.—Below.

ROVER, 3½h.p., 3 speeds, solo, in nice condition; £34.—Percy and Co., 337, Euston Rd., London. [5940

3½h.p. Rover 3-speed Combination; £25.—De Paepe, Linden Braadshill, Colnbrook, Bucks. [5886

ROVER, 4h.p., 1914½, 3-speed, clutch, grand order; £28; must sell.—Box 2,012, c/o *The Motor Cycle.* [X5244

1914 3½h.p. T.T. Rover, just overhauled; £30.—Gourlay, Australian Hospital, Harefield, Middlesex. [5761

ROVER 1915 3½h.p. Combination, 3 speeds, genuine Rover sidecar, with brake, all accessories, excellent condition; £52.—Maudes', 100, Gt. Portland St., London, W.1. [5739

ROVER Motor Cycles, 3½h.p. and 5-6h.p. models, in stock for immediate delivery, both solo and sidecar outfits; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [5676

Royal Ruby.

ROYAL Ruby, 1917 (shop-soiled only), 3½h.p. J.A.P. engine, 3-speed Sturmey-Archer countershaft gear, kick start, hand clutch; list price £72; what offers, cash, or exchange good turnout, piano, or lightweight.—Bunting's Motor Exchange, Mason's Av., Harrow. [5867

Rudge.

RUDGE Multi, 5-6h.p., with coach sidecar, very powerful; £45.—Motor Exchange, Horton St., Halifax. [5856

RUDGE, 3½h.p., 1913, and sidecar, 2-speed N.S.U., in excellent condition; £22.—T., 24, Townley Rd., Dulwich. [5789

RUDGE Multi Combination, in real nice order and condition, speedometer, disc wheels; £35.—Percy and Co., 337, Euston Rd., London. [5944

RUDGE, 3½h.p., special model, all accessories, Jones speedometer, condition like new; £24.—Maudes', 100, Gt. Portland St., London, W.1. [5740

3½h.p. 1917 Rudge Multi, up-to-date machine, new condition, includes all accessories; price 50 gns.; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5903

RUDGE Multi Coachbuilt Combination, 3½h.p., splendid condition; bargain; speedometer, mechanical horn; £29.—131, Green St., Forest Gate, E.7. [X5214

RUDGE Multi 1917 Coachbuilt Combination, in perfect condition, Jones speedometer, Stewart warning signal, lamps, new spare tyre and spares; £50 cash.—20, Amberley Grove, East Croydon. [5769

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Rudge Multi, 1914, 3½h.p., re-enamelled and replated, 36 gns.; Rudge Multi, 1913, 3½h.p., standard, 28 gns.; Rudge, 1913, 3½h.p., variable gear, solo, 23 gns., with sporting sidecar 29 gns.; Rudge, 1915, 5-6h.p., 3-speed, clutch, kick start, 37 gns.; Rudge, 1913, 3½h.p., single speed, 21 gns. [5827

Scott.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Scott, 1914, 3h.p., 2-speed, clutch, kick start, Scott coach sidecar, 37 gns.; solo, 31 gns.; many Scott parts in stock. [5832

Sheffield Minor.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Sheffield Minor, 1916, 2-stroke, sloping tank, as new; 19 gns. [5830

Singer.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Singer, 1914, T.T., 2½h.p., clutch, 19 gns.; Singer, 1913, 3½h.p., clutch, 22 gns. [5831

3½h.p. Singer, all accessories, recently overhauled, enamelling and plate as new, Villiers hub, good tyres, thorough running order; open to inspection; cheap, £35.—W., 14, Barttelot Rd., Horsham. (D) [X5261

Sun.

SUN V.T.S., nearly new; £28, bargain; owner called up.—Roberts, 22, Woodland St., Smethwick. [5768

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Sun-Villiers, 1916, 2½h.p., 2-speed, 24 gns.; ditto, single speed, 18 gns. [5833

SUN-VILLIERS 2-stroke Motor Cycle, nearly new Dunlop studded tyres and belt, mechanically sound; bargain, £12/10.—Peat, 72, The Chase, Clapham Common, S.W. [5778

Sunbeam.

1916 Sunbeam, 8h.p., condition absolutely as new, very little used; largest offer over £70.—Lubbock, High Elms, Orpington, Kent. [5783

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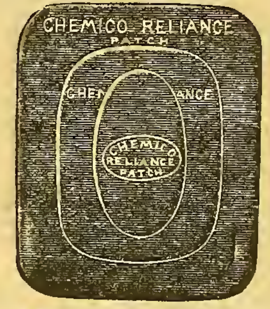

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Investigate—ask the users for opinions.

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Sunbeam.

SUNBEAM 4h.p. Combination, 1917 War Office Model, fully equipped, run 700 miles; £105.—Percy and Co., 337, Euston Rd., London. [5941

3½h.p. Sunbeam Combination, 1914 model, nice sound turnout, includes Lucas best accessories, tools, storm apron; £75; guaranteed.—Wauchope's, 9, Shoe Lane, London. [5904

SUNBEAM Combination, 1916, 6h.p. M.A.G., lamps, horns, very good condition throughout; £100; exchanges entertained.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0480

LATEST 1917 (May) 3½h.p. £90 Military Sunbeam, 3-speed, kick, Duplex tank, clutch, Lucas lamps, mechanical horn, unused 1918, beautiful machine; reasonable offer.—Lord, Mountfield, Prestwich. [X5246

T.D.C.

1916 T.D.C., De Luxe Motor Cycle, less magneto and carburetter; £8.—Mason's Garage, Letchworth. [5873

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—T.D.C., 1915, 2½h.p., 2-speed, 2-stroke; 22 gns. [5835

Triumph.

1913 Triumph, clutch model, excellent condition; £19, immense bargain.—54, Seymour Rd., Leyton. [5880

4h.p. 3-speed Countershaft Triumph, perfect; £45, or near.—Paterson, Percival Parade, Worcester Park. [5885

TRIUMPH, 1913, 3½h.p., clutch model, Bosch mag., Triumph carburetter, £22; Triumph, 1909, Bosch mag., £17; Triumph, 1913 clutch model, just been overhauled, requires reassembling, £20.—Maudes', 100, Gt. Portland St., London, W.1. [5741

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Triumph, 1913, 3½h.p., 3-speed combination, 36 gns.; Triumph, 1913, 3½h.p., 2-speed, 24 gns., with sidecar 29 gns.; Triumph, 1913 T.T., clutch, fine order, 25 gns.; Triumph, 1913 T.T., single speed, 22 gns.; Triumph, 1911, 3½h.p., 2-speed, clutch, 19 gns.; ditto, single speed, 14 gns.; many Triumph parts in stock.—'Phone: Hampstead 5392 [5834

Velocette.

VELOCETTE, 2 speeds, Watford speedometer, first-class order; £25.—Darke, Draper, Sutton, Surrey. [5759

Williamson.

WILLIAMSON 8-10h.p. 1914 Combination, water-cooled, perfect condition, very little used, every accessory; bargain, £60, or exchange 2¾h.p. Douglas and cash.—Gardner, Birchington, Kent. [X5252

MOTOR CYCLES FOR SALE

Wolf.

RIDER TROWARD and Co., 31 and 40b, H Hampstead.—Wolf, 1916, 2-stroke, good 19 gns.

WOLF, 2¾h.p., 2-speed, free engine, kick sta model; £27/10.—Motor Exchange, Hort Halifax.

Wooler.

RIDER TROWARD and Co., 31 and 40b, H Hampstead.—Wooler, 1916, 2-speed, 2-stroke, frame, as new; 29 gns.

Zenith.

ZENITH, 1917, 4-5h.p., Model C., lamps, ho done 1,000 miles; £52.—100, Gt. Portla London, W.1.

ZENITH Motor Cycle and Sidecar, 1913, Zenith-Gradua gear, B. and B., perfect con £45, or near offer.—Whitney, 48, Edith Rd., Pe

ZENITH-GRADUA, 3½h.p., just overhauled, a condition, new tyres and tubes, Stewart ometer, horn; £21, or nearest.—Gill, St. Elmo, W Essex.

3½h.p. Zenith-Gradua, 1912, J.A.P. engine, condition and perfect running order, had cally no use for last 3 years; 20 gns., lowest.—B Lowesmoor, Worcester.

RIDER TROWARD and Co., 31 and 40b, Hi Hampstead.—Zenith-Gradua, 1911, 3½h.p., 2 1913 6h.p., 29 gns.; 1913 6h.p. combinatio gns.; 1914 6h.p. combination, clutch and kick 45 gns.; 1914 8h.p. countershaft combination, 4 1915 8h.p. countershaft combination, 59 gns.; 8h.p. T.T. solo, 52 gns.; 1916 4-5h.p. twin, as 48 gns.; 1915 4-5h.p. twin, sporting sidecar, 5 solo, 44 gns.—'Phone: Hampstead 5392.

Miscellaneous.

1916 Indian Powerplus Combination, as new;

1916 Indian Powerplus Combination, as new; £8 both electric models.

1916 Enfield Combination, in good order; £

1915 Indian, 3-speed model, solo; £55.

1915 Harley-Davidson Combination; £60.

1915 Levis (Baby), disc wheels, like new; £

1914 Indian, 2-speed, and sidecar; £50.

1915 B.S.A. 4h.p. Combination; £50.

1913 3½h.p. Rudge Multi; £28.

1913 2¾h.p. Douglas, 2-speed; £33.

1914 6h.p. Sunbeam Combination, A1 condition;

1914 New Hudson Combination; £37.

1913 New Hudson and sidecar; £32.

1913 Rover, 3-speed, solo; £33.

1913 Arno, 3-speed, and sidecar; £24.

1913 6h.p. Rex and coach sidecar; £45.

1912 6h.p. Rex, solo; £20.

3½h.p. Brown, 2-speed N.S.U.; £19/10.

1912 Douglas, 2-speed, in splendid order, newly en elled; £25.

ALL the Above Machines are guaranteed in the of order, and sent on approval, deposit.

TO Officers and Soldiers on Leave.—Please note we do not let on hire motor cycles, but we prepared to sell you a machine and repurchase same a given fixed price when your leave is up, provi that the machine is in good running order.—Jones' age, Broadway, Muswell Hill, N.10. 'Phone: Hor 2562. [5

MEBES and Mebes have the following motor c for immediate disposal at bargain prices:

1916 Enfield 6h.p. Combination, as new; £85.

1917 4¼h.p. B.S.A. Combination, as new; £90.

1914 2¾h.p. A.J.S., 3-speed countershaft; £40.

1914 2¾h.p. Enfield, 2-speed, chain drive; £35.

1916 2¾h.p. Connaught, 2-stroke; £26.

1916 Levis, free engine, clutch; £27/10.

154-6, Great Portland St., W.1. Tel.: 3 Mayfair. [5

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British Magnetos.

IT is hardly necessary for us to remind our readers that we have in the past done our utmost, in conjunction with our parent journal *The Autocar*, to further the interests of the magneto industry in this country. The present is, however, an appropriate time for referring again to this important subject, and for this reason. Last week the British Ignition Apparatus Association invited representatives of the press and the motor industry to visit the works of certain firms who are members of the Association. The object of this gathering and inspection was to convince those who were intimately concerned in the commercial use of magnetos and those whose position enabled them to pass on their knowledge to the public, of the absolutely sound condition of the British magneto industry. Personally, we required no convincing, for we had been on a somewhat similar round of inspection a few months ago; but, though we had learnt much on that occasion, our second visit last week showed us that the whole subject could not be assimilated at once, and we became acquainted with many more details of this important work.

At the outbreak of war there was, we believe, only one British firm engaged in the manufacture of what will readily be acknowledged to be a highly specialised job, viz., the making of magnetos, and these were not being made for motor cycles or cars, and much less for aeroplanes, but for work of a far less exacting character. That being the case, the strides made by the British magneto manufacturers are little short of miraculous, and they have deserved the gratitude of the whole nation.

Before the war it was—and this in spite of our efforts—generally accepted that the Germans were supreme and unapproachable in the manufacture of magnetos. In fact, one journal went so far as to assert that there was something in the air of Stuttgart which, like the water of Burton in the matter of beer, lent itself to the making of magnetos; further, that there was some wonderful quality in the mentality of the German workman which tended to the same end, and that it was therefore useless to try to compete with the great enemy firm that flooded our country with magnetos—and good magnetos, too, else would our fault have been far greater.

Now, to the infinite credit of all concerned, we have proved to the world that what the Germans can do, we also can do, and do it better. For, in spite of the immense difficulties which had to be faced in obtaining the correct raw materials, in setting up suitable machinery, and training workmen to the high degree of skill that is necessary, the British magneto is probably the best in the world, and certainly second to none. We are afraid that the Government did but little to assist. First of all, they ignored the Britisher, and expected to get all the magnetos they required from America. Then they changed their minds, and pressed for the immediate delivery of large quantities of magnetos "to a design not yet completed and on plant we had not got." We quote from memory the witty remark of the chairman, Mr. Peter F. Bennett, at one of the gatherings which formed a pleasant change from the round of inspection and the noise of machinery.

On aeroplanes magnetos are put to very strenuous work. With some engines the vibration is enormous, and when there are a large number of cylinders, even though the r.p.m. is not excessive (say, twelve cylinders at 1,500 r.p.m.), the magneto has to produce 9,000 sparks per minute. We saw an aeroplane magneto of special design giving four sparks per revolution which is capable of a regular output of 16,000 sparks per minute. This, of course, means very careful design and the utmost accuracy in manufacture. One of the latest Bosch magnetos, recently captured from the enemy, broke down at about one-third of this speed. Is it therefore any wonder that even the German airmen use British magnetos—when they can get them?

An index to the advertisements in this issue will be found on the page facing the back cover

NOVEL TWO-STROKE DESIGNS.

Some Recent Patents granted to Inventors of "Improved" Two-stroke Engines.

ONE has only to go through the patent files to appreciate that the interest in the two-stroke cycle shows no sign of abating. At a recent meeting of a graduates' section of the Institution of Automobile Engineers, we were interested to learn that Mr. Cyril G. Pullin, the last Senior T.T. winner, was actively interested in the two-stroke engine, and he gave some very interesting figures to show that he has been thoroughly investigating the merits of the simple engine with a view to its embodiment in a low price motor cycle for after-the-war production.

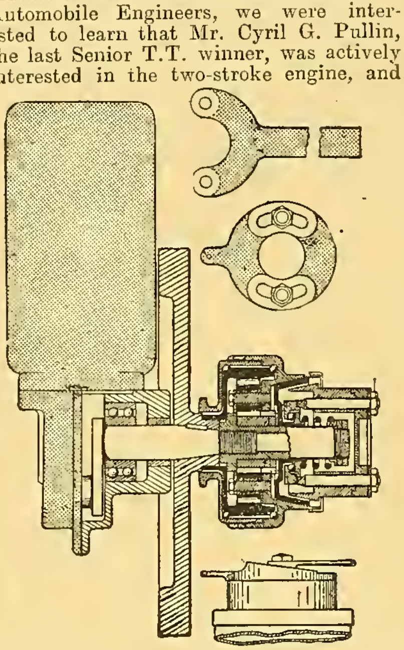


Fig. 1.—A patent by Mr. Cyril G. Pullin of a simple epicyclic gear to be fixed on the crankshaft.

Mr. Pullin gave a brief specification of a machine which, in the motor cycle world, would occupy the same position as that enjoyed by the Ford among cars. Hence the patent drawing bearing his name, which we reproduce (fig. 1), while not referring to two-stroke engines exactly, may be taken as a shadow of coming events.

The design is of a simple epicyclic gear for the crankshaft of what appears to be a small water-cooled two-stroke engine. The invention consists in a spring-controlled clutch with internal and external friction surfaces reciprocating between corresponding rotary and stationary members, a non-rotating device withdrawing the clutch from engagement, and a rotary action member having inclines actuating the clutch withdrawing device.

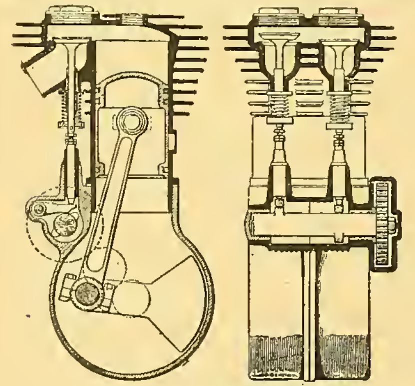


Fig. 2.—A two-stroke patented by Mr. G. E. Stanley.

Another well-known name in the competition world is G. E. Stanley. The ex-Singer crack has patented a two-stroke engine (fig. 2), which is interesting. In a single-cylinder engine, the invention consists in the embodiment of two exhaust valves of the poppet type, which are operated by cams on a half-time shaft. These cams are placed at 180°, so that the valves are actuated alternately. Each valve, therefore, is subjected only to the effects of one-half the exhaust strokes, and has an opportunity of cooling between each operative period.

Another interesting design is shown in fig. 3, which, while being very unconventional, is, nevertheless, interesting to all who follow the mechanics of the motor cycle. This is Marshall's motor wheel—an attempt to embody the power plant within the hub of the wheel. In fact, the cylinder (water and air-cooled) acts as the hub shell in which a ring piston operates. It has two connecting rods and two crankshafts which drive bevel pinions meshing with a larger and fixed toothed ring. A study of the drawing will reveal that the engine must revolve about the central axle, since the toothed ring is fixed. The carburetter is fixed to the hollow spindle, and the ignition current is carried through a fixed ring shown at the left side of the drawing.

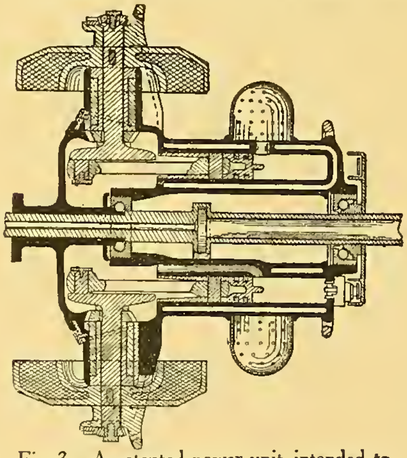
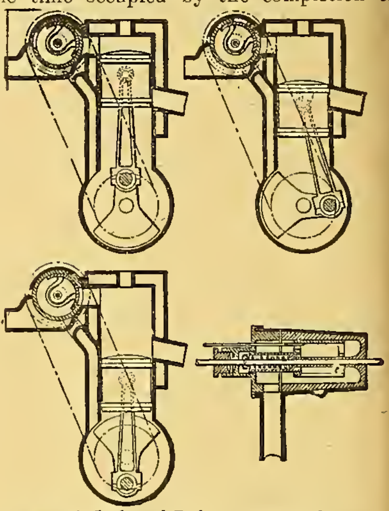


Fig. 3.—A patented power unit intended to be used within the hub of a wheel.

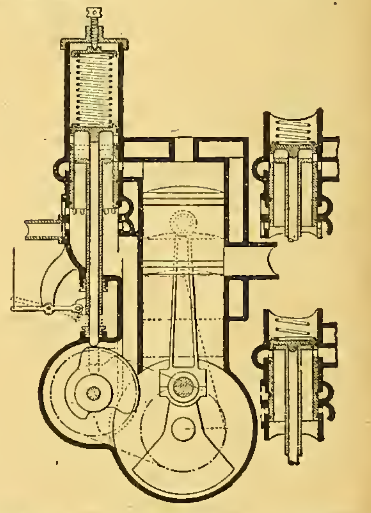
Probably the most interesting designs in the group under review are those of Messrs. Thomas and Edwards. These designs embody a rotary and a cam-operated piston valve respectively.

Figs. 4, 5, 6, and 7 depict the rotary valve design. The valve is located at the side of the head of the cylinder, and is driven by a chain or other suitable transmission. It is intended that a charge of gas is, during the up stroke of the piston, drawn into the crank case through a transfer pipe leading from the valve. On the approach to the completion of the upward stroke of the piston the supply of gas is cut off by the valve, and air from the atmosphere is admitted during the time occupied by the completion of the stroke. This air being the last to enter the transfer pipe will be the first to enter the cylinder when the new charge follows the exhaust down the cylinder at the bottom of the next stroke; therefore there is a layer of air between the burnt and new gases. Within the rotary valve there is a cut-off valve which can be hand operated.



Figs. 4, 5, 6, and 7 show a patented rotary valve, which is located at the side of the head of the cylinder.

In the second design, figs. 8, 9, and 10, the same principles are embodied in an engine having a piston valve, within which is a cut-off valve. This piston valve is operated by a cam, with a spring for its return.



Figs. 8, 9, and 10.—A design having a piston valve operated by a cam.

OCCASIONAL COMMENTS.

By "IXION."

The Future of the Little 'Uns.

I NOTICE that various readers are bad-wording me in our Correspondence columns for espousing the cause of the lightweight, and prophesying that some day small engines will reach a standard of speed and reliability now attained by nothing under 3½ h.p. Please perceive that I have never said that pre-war lightweights or the few existing experimental lightweights will do the trick. Technically, there is no reason why we should not get all the power we need out of a miniature single-cylinder, two-stroke or four-stroke; practically at least seven buyers out of ten would give a decent lightweight the preference over a decent medium or heavyweight.

In Favour of Lightweights.

READERS will denounce such a chronic speedster as myself for estimating the potential lightweight enthusiasts at 70% of the motor cycling public; but I guess the percentage with some confidence. Practically all the girls (bless 'em!) prefer lightweights. So do the old men. So do the lazy men, who dislike propping up solo machines in an attitude reminiscent of helping your mother-in-law into a tram. So do the nervous men (and many motor cyclists are secretly terrified of their machines three times per day, though they would rather die than tell you so). Deducting the stalwarts, you get a large majority for the lightweight, when—the lightweight is fit to ride.

Wanted, a Lightweight de Luxe.

HITHERTO the motor world has been dominated by the fallacy that the price of a motor should be in proportion to its bulk. This certainly applies to ships, buns, and certain other commodities, but not necessarily to motor bicycles. It has been taken for granted that if a 3½ h.p. bicycle costs £60, a 1¾ h.p. bicycle should sell at £30. This is largely a delusion. When you are toting round a lot of h.p. which you seldom use, you can put up with indifferent workmanship and third-rate design and material, up to certain limits: when your nominal h.p. is the absolute minimum requisite for road work, you need a machine de luxe. The manufacturer can save very little on the cost of material in making a 1¾ h.p. as compared with a 3½ h.p. Workmanship is the main item in both costings, and the workmanship of the little 'un must be superb: otherwise, as every experienced rider of the breed knows, oil leaks and rapidly fading power make the machine a curse to its owner. I quite think that the best way to accelerate the inevitable and natural lightweight boom would be for a firm of the highest standing to produce a 1¾ h.p. at £50 or £60. If this attempt be made, the resultant machine will not ooze oil at every pore, will not drop to two flea-power after a week's work, will not toil painfully up gentle grades at 5 m.p.h., but will create a vogue for itself amongst a moneyed and fastidious class of buyers. Then some vulgarer soul will plot to market a similar machine at a lower cost, urged on by the coming millions of girl motor cyclists and others. And the decent lightweight will become a commonplace.

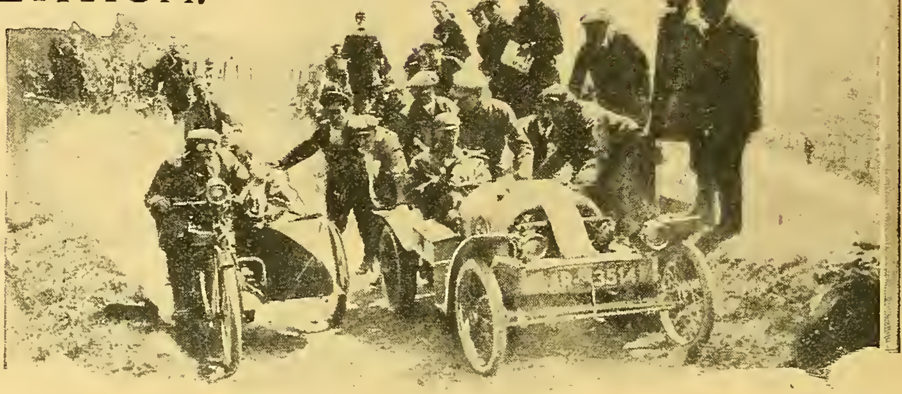
The Technical Possibilities.

"VIC," who regards my lightweight dreams as entirely pernicious, is perhaps unaware that the smallest petrol engine cylinders in the world are made for continuous heavy duty under war conditions. Price being immaterial within wide limits, the engine in question stands up well. To get the requisite power out of a stated c.c. is a matter of development, and development always awaits a stimulus. We did not get 300 h.p. out of a 150 h.p. engine until war aviation compelled such developments. We did not get 70 b.h.p. out of a four-cylinder 80 mm. bore car engine until a quaint taxation scheme and trade competition set engineers' brains waving feebly in that direction. Nor shall we get roadworthy lightweights till the necessary stimulus is applied; and then everybody will wonder why we did not have them in 1906. Maintenance of power in lightweights depends on three main factors: The lubrication system must be proof against swift carbonisation (past lightweights have been disfigured by a ridiculous oiling system: barely tolerable on light-duty engines, but insane on machines forced to rev. continuously). The various metals employed, especially for valves and piston rings, must be well chosen; no profound problem in metallurgy is involved, but in the past our lightweight valves warped and pitted, our lightweight piston rings ceased to act as a compression seal in three days' work, our pistons distorted, and our cylinders swelled egg-shaped. Cooling must be efficient: and pre-war air-cooling was barely adequate for engines of 3½-7 nominal h.p., which did nearly all their work on quarter throttle or less; still less was it efficient on the babies, which normally ran on half throttle.

The Commercial Aspects.

AS hinted above, the business factors are our chief handicap. For the present, the lightweight engine must be beautifully made. It will show a very trifling saving over the bigger engines on the score of raw material, but there will be a much bigger percentage of scrap in the shops, the workmanship must be more highly skilled, and the materials must be of better quality. To express this point graphically, I should say that a crack firm could make a first-class 1¾ h.p. with profit at a selling price of £70. a ditto 2¾ h.p. at £60, and a ditto 3½ h.p. at £50. In actual practice the public expect a 3½ h.p. for £50 and a 1¾ h.p. for £25. This is the real reason why the half-baked two-stroke leapt into such sudden popularity. Every engineer was familiar with its intrinsic limitations and its unsolved problems. But in its cruder forms it was an infinitely cheap engine to make, and, however shoddily it might be slung together, it would run after a fashion, and maintain such power as it could squeeze out for a thousand miles. It was the path of least resistance: and the trade took it. When its surviving weaknesses yield to invention, it may solve all the lightweight difficulties: and it so happens that two-strokes are receiving unusual attention from clever men just now.

THE SINGLE-CYLINDER IN COMPETITION.



A 3½ h.p. Premier sidecar passing an H. and S. cycle car on Amulree Hill.

An Harangue on the Merits of the Single, as Proved by Competition Results.

By DEAN BARRY.

GENTLEMEN of the trade, gentlemen of the road, I hold a brief for the single-cylinder engine. It is my honour to address you to uphold the type of engine that has done so much to make motor cycling popular. There are many among you who would forget the tried and proved friend of the past and follow the flame of a will-o'-th'-wisp because there is so much written and said and promised by the enthusiasts for "flat twins" and "big twins" and "fours."

I am a "big twin" man myself. I like the idea of a good "four" also, and I have owned a "flat twin"; but I have not secured extra pleasure equivalent to the extra cost and trouble with a big twin compared with the simple reliable single. True, with a big twin sidecar I have taken a few minutes off my best single sidecar time on a thirty-mile journey I made fairly frequently, and I have made some very long runs with a sidecar without changing gear, but it has cost me at least another £20 per annum to do it, and I doubt whether I got value.

I think of four cylinders because I am getting old—at least I am older than I was—and the luxurious appeals to a man who is an enthusiast.

"Flat" Twins.

As for flat twins, perhaps my experience has been unfortunate; but for ordinary every-day sidecar work, and an occasional tour at holiday times, for the man of moderate means I favour the medium powered single. We are not all worshippers at the shrine of mechanical ingenuity. It is trite to say that most of us own a motor cycle to use as a means of transportation, to get out into the country. In other words, it is motor cycling that appeals to us, and not the machine as an example of the skill of the motor cycle engineer. What does it matter if the flat twin is theoretically superior? The fact remains, the single will do the same amount of work at a lower cost and at less expenditure of time in tuning than any other type of engine. As for speed—well, we can double the legal limit when we want to, and, what is more, the modern single can maintain that speed, if need be, as witness the twin-single test, over which there was so much controversy. The very fact that it was difficult to decide to which machine the more credit was due—when the twin had an engine nearly twice the capacity of the single—speaks volumes.

Pre-war competitions — as strenuous as they were—failed to eliminate completely the medium powered single. They seem so long ago that they may be forgotten by many of the present-day riders and potential riders.

The Z bend on Cowdale, one of the noted hills in the A.C.U. One Day and Six Days Trials of 1914

The Single in Competition.

Great injustice was done to the single-cylinder by competitions committees, who forced the smaller type of machine with sidecar to compete on level terms with big twins. Competition rules were framed to eliminate as many machines as possible—to do this, courses had to be found which would knock out the "big feller," and they did it. What chance had the 500 c.c. single sidecar outfit over courses picked to try so severely machines with engines twice the size? Yet they acquitted themselves very creditably.

(1) One of the many paved lanes in Yorkshire included in the 1914 A.C.U. Six Days Trial.

(2) A hairpin bend on the famous Tornapress Hill (better known as Applecross), which rises over 2,000 feet in six miles of grass grown, boulder-strewn track.

(3) A "staircase" lane in the A.C.U. Six Days Trial.

I was in most of the 1914 trials as passenger aboard a single-cylinder outfit, and only those in these competitions and on similar machines know the real capabilities of the single. Take, for example, the A.C.U. One Day Spring Trial of 1914. There were fifty-four single solo mounts entered, of which thirteen obtained first-class certificates and twenty-seven certificates of merit; only four failed to finish. The twin solo machines did better, it is true: but most of them were big twins, and there should be no course where sidecars can go at all that should knock out a big twin ridden solo.

In the sidecar class, thirteen singles started, of which seven finished—one with a first-class certificate and a 500 c.c. machine at that. The remaining six secured certificates of merit. The twin sidecars did not do so well. Forty-six started, twelve secured first-class certificates and eighteen certificates of merit—thirty all told.

Then in the A.C.U. Six Days', fifty-six solo singles started—many of them ridiculously small lightweights, some under 200 c.c. capacity—yet thirty-four finished, while in the twin class thirty-two solo machines started and only seventeen finished. A few manufacturers were daring enough to enter 500 c.c. single-cylinder sidecars in this event. There were five of them, and two finished, one—again a 500 c.c. outfit—being awarded a special medal for its meritorious performance. In the twin classes, thirty-two solo machines started and seventeen finished; twenty-four sidecars started and thirteen finished.

In this event the singles proved that they could do all the twin could accomplish—perhaps not so well; but it is sufficient to know that over the most difficult courses ever picked for a trial—up staircase lanes and almost every freak hill to be found in hilly Yorkshire and Derbyshire—the singles stood up to the hardest six days' gruelling ever planned by the A.C.U.

Again, in the Scottish trials of 1914 solo singles secured forty-one awards out of fifty-two entries, solo twins nineteen out of twenty-seven, and sidecar twins ten out of twenty-one. There were three single sidecars in this time, and for the first four days they covered themselves with glory on the noted hills of Scotland, including Amulree, Abriachan, Cairn-o'-Mount, Cockbrig Ladder, and Trinafour. It was the famous Applecross Hill, with its 2,200 feet climb in six miles of boulder-strewn path, that proved their Waterloo. They all finished with red-hot engines, after about four miles in bottom gear.

But Applecross has been scaled in competition by a single-cylinder sidecar. Hugh Gibson in the 1913 Scottish trial succeeded in making a non-stop climb—

The Single-cylinder in Competition.—

in fact, he secured a gold medal—with a 3½ h.p. Bradbury fitted with a three-speed hub gear. On the same or a similar machine the same rider secured an award in the 1912 event, in which, out of twenty-nine gold medals, nineteen were secured by singles.

Has ever a 500 c.c. twin sidecar outfit won an award in any of these classic events? No. It is safe to say that a twin of even 600 c.c. capacity cannot emulate the 500 c.c. single.

T.T. Evidence.

Then there is the T.T. race. The winners of both senior and junior events in 1914 were singles—a Rudge and A.J.S. respectively. In the junior event fifteen singles started and eleven finished. The twins numbered thirty-four, but only nineteen finished.

In the senior event, forty-nine singles started and thirty-two finished; fifty-two twins started and only eighteen finished.

Finally, let us remember that all the 500 c.c. records are held by the single-cylinder machine. Twins have wrested the laurels from the single-lunger, but the single has resecured them. The Norton alone holds the following:

500 c.c. CLASS. SOLO RECORDS.

	Speed.
Flying kilo.	82.85 m.p.h.
Flying mile	78.95 m.p.h.
Flying five miles	75.88 m.p.h.
Standing ten miles	73.29 m.p.h.

750 c.c. CLASS. SOLO RECORDS, WITH 500 c.c. ENGINE.

	Time.
Kilo.	0m. 27⅕s.
Mile	0m. 45⅘s.
Five miles	3m. 51⅕s.
Ten miles	8m. 11⅕s.

500 c.c. SIDECAR RECORDS.

	Speed.
Flying kilo.	64.65 m.p.h.
Flying mile	62.07 m.p.h.
Flying five miles	58.78 m.p.h.

All the 750 c.c. sidecar records are held by a single, as well as the five miles record in the 1,000 c.c. class.

What has the twin done to warrant the opinion so popular among "experts," that the single is doomed? There is a lot of life in the old single yet, and now that really efficient shock absorbers are within a measurable distance of success, it will be a long time before the single will be a back number and classed among the obsolete steps in the evolution of the motor cycle. Gentlemen, what is your verdict?

LIVING IN THE COUNTRY.

The Motor Cycle and the Town Dweller.

FOR many years past the average British artisan has resented, silently or otherwise, the evil fate which compelled him to live in dingy streets. He intends to alter this after the war. Many thousands of soldiers have applied for "homesteads" (presumably a country cottage with a bit of land attached to it) after the war. Thousands of civilians are putting in all their spare time on allotments, which more often than not consist of a bit of shallow, third-rate land, practically unfenced, and most inconveniently situated in relation to their homes: one may see these patriots wheeling gardening tools along public streets in children's pushcarts any Saturday afternoon. Some of these allotment-holders will relapse after the war. Many are bitten with the land craze. They have conceived a novel passion for a country cottage with a few rods of land attached to it inside their own fence. After the war there will be a great push for country homes for artisans: and transport will be a main difficulty. Garden cities are perpetually being founded in the suburbs of London and of a few large provincial towns. In such cases transport difficulties do not exist. The motor 'bus and electric tram services push out their tentacles a mile or two further, and the problem is solved. This solution is hardly applicable to typical provincial areas. Still less is it desirable. England would be spoilt if our urban tram services defaced and endangered our country roads.

Nevertheless, a country home is necessarily distant from the factory where millions of intending rural householders will work. A Labour Government is a possibility of the near-future, and may be trusted to remember the workers' aspiration for pleasanter homes. Whilst it cannot be pretended that the motor cycle can solve all the transport questions involved, it is tolerably obvious that the artisan will enter more and more into the market for the cheaper types of motor, with the motor bicycle first, and the cycle car second. In framing post-war plans, manufacturers should allow for this novel and expanding market. It implies the placing of a new value on two familiar items concerned in every production scheme. The first is that of output, the second is that of price. In the first place, the artisan market is largely untapped by motor cycles, except amongst the best paid workmen, especially in Lancashire, Yorkshire, and Birmingham. Much larger sales can be expected in this direction. Secondly, the lower the price, the greater the market. The sporting youngster and middle-class hobbyseeker are not particular to £25 what they pay for a machine. Many artisans would buy at £50, but cannot buy at £75. If any firm can weigh in with a cheap quantity 3½ h.p. machine, capable of sidecar work, within three years after the end of the war, it will do a mighty business.

Despatch riders attached to the Royal Engineers mounted on W.D. Triumphs. Reading from left to right: L. Moore, H. Rayne, H. Newton, and H. Dovaston. All were enthusiastic motor cyclists before the war. Moore was a track cyclist; Rayne, Newton, and Dovaston being keen members of various motor cycling clubs.

CONTINUED SUCCESSES OF

B·S·A

Motor Bicycles

IN AUSTRALASIA.

VICTORIA M.C.C. PATRIOTIC CARNIVAL,
EASTER, 1918.

150 MILES RELIABILITY TRIAL:

		POINTS
B.S.A.	(H. Bristow)	**100%**
B.S.A.	(D. Y. Rennie)	**100%**
B.S.A.	(E. Tyler)	**100%**

B.S.A. Machines were the only competitors to score the full number of points.

SOUTH AUSTRALIA 100 MILES SIDECAR CHAMPIONSHIP:

B.S.A. FIRST
B.S.A. SECOND

CHRISTCHURCH (N.Z.) RED CROSS CARNIVAL

B.S.A. RIDERS WON
FOUR FIRSTS
and
THREE SECONDS

BIRMINGHAM SMALL ARMS Co LTD
TRADE MARK
BSA
BIRMINGHAM

THE BIRMINGHAM
SMALL ARMS
COMPANY, LIMITED,
SMALL HEATH,
BIRMINGHAM.

It's just like this

—there cannot be too many CLYNOS when the War is over—its popularity before, its record during the War, make that a certainty—
THEREFORE, we have decided on a policy embodying the following features:

1. **Mass production of one model (to increase output and reduce productive cost).**
2. **Prices for both Outfit and Spares competitive with any combination of equal reputation.**
3. **Rotational delivery (to ensure to those who order now, delivery within a specified period of the ending of the War).**

That's a policy you will appreciate—so ask your agent for fuller details and us for latest folder, "The Post-war Clyno."

The Post-war
CLYNO

The Clyno Engineering Co.,
Pelham St., Wolverhampton.

CURRENT CHAT

Times to Light Lamps.

SUMMER TIME.

June 20th	9.45 p.m.
,, 22nd	9.49 ,,
,, 24th	9.49 ,,
,, 26th	9.49 ,,

British Engineering Standards Association.

The Engineering Standards Committee has now become incorporated under the Companies Acts, 1908-1917, the word limited being omitted by licence of the Board of Trade.

Scotch Shale Oil.

The companies interested in the production and distribution of this useful commodity have now entered into an arrangement to facilitate its distribution. Whether the arrangement will bear any practical fruit at the present time or not we cannot say.

Oil from Slate?

Quoting a Swedish contemporary *The Autocar* states that satisfactory experiments have been carried out in Sweden with this end in view. And yet there are still people who persist in regarding themselves as intelligent and who find time to ridicule the old alchemists!

Westerham Motoring Popular.

Twelve L.G.O. 'buses were running on a recent fine Sunday between Bromley and Westerham Hill, distance eight miles, and every day these 'buses carry a number of pleasure riders, as they link up with the service from London, Woolwich, etc., the return fare from the city being 2s. One notes many changes on the Westerham Road, but most of the wayside tea and refreshment houses are carrying on their business as usual, thanks to the 'bus tourists alone.

Petrol in Ireland.

In the House of Lords last week, Lord Willoughby de Broke asked the Government whether the Defence of the Realm Regulations have been applied impartially as between Great Britain and Ireland. He said with regard to petrol, unless one happened to be a Sinn Feiner it was difficult to get any petrol at all; if one belonged to the disloyal forces petrol was immediately forthcoming. These things seemed to show that Ireland had been placed in a particularly privileged position.

The Earl of Crawford, in reply, said that the restrictions on the use of petrol applied equally in Great Britain and Ireland, and were administered by the police.

Special Features.

THE FLAT TWIN TWO-STROKE.

THE SINGLE-CYLINDER IN COMPETITION.

NOVEL TWO-STROKE DESIGNS.

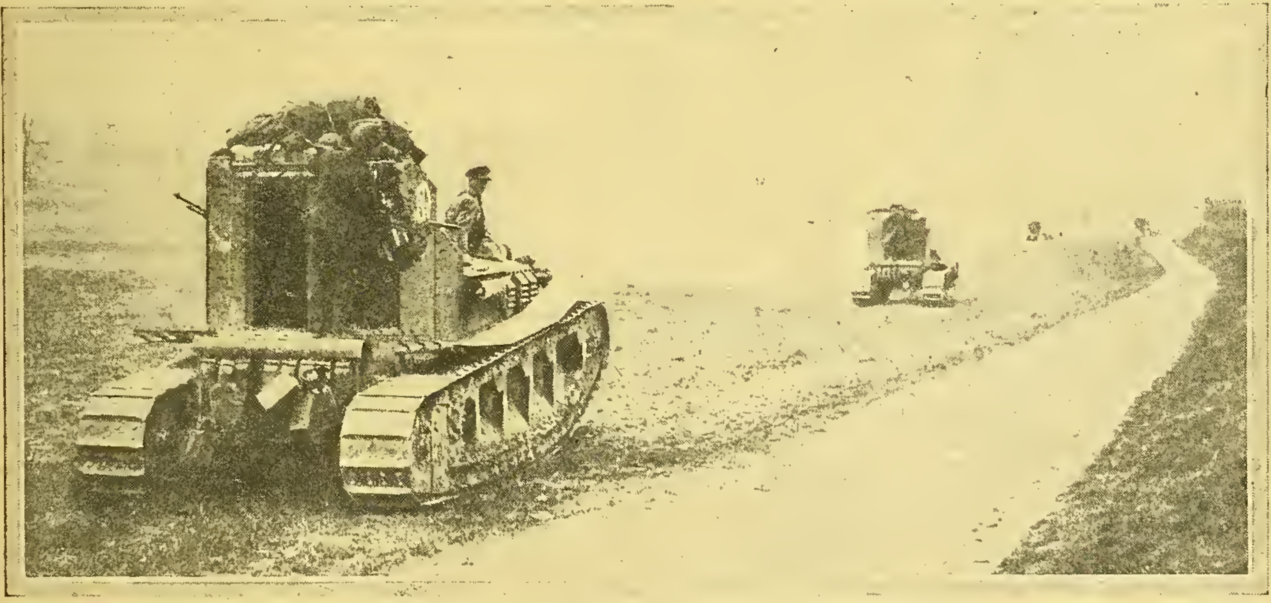
The £190 Sidecar Outfit.

From the *Johannesburg Sporting Star*, April 20th, 1918: "If anyone had said three years ago that, in 1918, a sidecar outfit would fetch £190 he would have been laughed at. Yet that is the price of the war model Collier's Matchless machine. The Diamond Cycle Co. have sold both the machines they had. They certainly were wonderful models, beautiful in detail and finish."

"Endurance" Run in U.S.A.

The Crotona Club recently held an "Endurance" run—apparently a euphemism for a road race—from New York to Boston and back. The distance was 530 miles, and had to be covered in the day, but out of seventy-four starters eighteen made perfect scores.

The most prominent makes were the Indian and Harley-Davidson, which divided between them the chief prizes, of which there appears to have been quite a plethora. H. Kunath (Indian and sidecar) made the best all-round showing.



Tanks of new design have been employed on the British Western Front. They are much lighter in weight and much faster than the old type. They do not replace the tanks of recognised form, however, but are intended to be used in positions where mobility is a great consideration.

Further Dunlop Activities.

The Dunlop Rubber Co., Ltd., is now developing an interesting endowment fund or insurance scheme for the benefit of its male employees. The main point of the scheme is that on attaining the age of fifty-five an employee shall be in a position to draw upon a substantial nest egg provided by the fund. The scheme embraces provision for pensions, death, and sickness.

Employment for Young Men.

Those interested in the careers of young men are recommended to get into touch with the Staff Bureau (Permanent Service), Dunlop Rubber Co., Ltd., Aston Cross, Birmingham. Ex-army men are specially looked for.

The Preservation of Pneumatic Tyres.

According to the Hun motor paper, *Motorwagen*, pneumatic tyres are best kept in a cool and well aired cellar. This most of our readers know, but experiments carried out in Germany indicate that inner tubes keep their elasticity better when in a solution of 10% glycerine and 1% soda in water.

The Dye Trade.

We have more than once dealt with the importance of the dye trade to the motorist as a possible source of—or, rather, inducement for—home-produced fuel of the benzene series. To develop the trade after the war, the Government has decided to prohibit the importation of any foreign dyes—which means German, as no other country counts for much—for a period of ten years after the war, "except under licence."

Trade Reconstruction in Germany.

While we are beset on every hand with committees for the amelioration of our post-war this or our post-war the other it is interesting to note that Germany is apparently little better off. In fact, a writer in the *Norddeutsche Allgemeine Zeitung* says that Germany is suffering in this war for her sins of omission, and his suggested remedy is the establishment of Chambers of Commerce in neutral countries at once, and in other countries after the war.

Apparently the suggestion meets with official approval and the guidance of official committees.

A Post-war Four-cylinder Engine.

A few days ago we dropped across Mr. A. W. Wall, the inventor of the Wall Auto-wheel. Mr. Wall has no active connection with the syndicate who make the attachment which bears his name, and is now engaged in work of a totally different nature. Incidentally, Mr. Wall informed us that he has designed a four-cylinder engine for motor cycles for after-the-war production. Details of this engine, of course, cannot be published, but we can say that presswork parts enter largely into its construction, and by reason of the cheapness of production of such parts the cost of making a four-cylinder engine for motor cycles should be considerably reduced. The four-cylinder engine is receiving a considerable amount of attention at the present time, and there will probably be several promising makes on the early post-war market

Mentioned for Valuable Services.

In a list published on June 14th of "Mentions for valuable services in connection with the war" brought to the attention of the Secretary of State, we notice the name of Lt. (Temp. Capt.) Cyril Patteson, R.A.F.; and among those employed by the Air Ministry the name of W. F. Guiver (Rolls-Royce Co.) is one of those brought to the notice of the Secretary of State in respect of the valuable services they have rendered. Both Cyril Patteson and W. F. Guiver have many brilliant performances to their credit in motor cycle competitions held before the war.

?

Have you Given
a
DEFINITE ORDER
for
The Motor Cycle
to be
Reserved or delivered regularly in future?

After JUNE 24 Newspaper "Returns" will be prohibited by the Government, and Newsagents will no longer be able to supply chance buyers. Only those readers who give definite orders will be sure of getting their copies.

An official Order—which comes into force on June 24th—has been issued by the Controller of Paper, prohibiting the system of supplying newspapers and periodicals "on sale or return."

In the past it has been the custom with publishers to allow newsagents to return unsold copies, and this enabled them to provide for the requirements of travellers and other chance buyers.

The new Order prohibits this custom, and consequently the newsagents, being unable to return unsold copies, obviously cannot be expected to run the risk of having copies left on their hands, and in future they will take only sufficient to supply definite orders.

To avoid the disappointment of being unable to obtain "The Motor Cycle," each reader who has not yet given a standing order should at once ask his newsagent to reserve or deliver a copy weekly, or, if preferred, a direct subscription may be placed with the publishers.

ILIFFE & SONS LTD.

Bosch Magnetos in Australia.

A recent Australian order forbids the importation of any magneto bearing the trade mark "Bosch."

Another Birthday Honour.

Capt. Geoffrey de Havilland, aeroplane designer (also designer of the Blackburne motor cycle formerly known as the de Havilland), has been made an Officer of the Order of the British Empire.

Typographical Error.

In the article by "Vedette" on "The Side-by-side Twin Engine" in our issue of June 6th the following sentence occurred with reference to the vertical two-cylinder engine with 180° cranks: "Its only drawback is its very irregular firing torque, two explosions taking place during one revolution and one in the next." The second "one" should, of course, have read "none."

A Quickly-built Motor Bicycle.

At a machine repair unit somewhere in France the captain-in-charge asked for a Harley-Davidson and sidecar. He was told that no such machine was available. The captain then pointed out that there were plenty of mechanics and plenty of parts, so he desired one to be built with the parts available. In two days two lieutenants and six motor cycle repairers built up a complete Harley-Davidson and sidecar from the spare parts, which gave absolute satisfaction, and six weeks after being built it was reported as going "better than ever."

Hun Fuel Experiments.

The shortage of petrol in Germany has been far worse than it has in England, and at times the fuel position in that country has been absolutely desperate. This has led to the carrying out of a number of interesting experiments with motor fuels, which have brought forth interesting results.

It was found that a litre of pure petrol could be run a distance of 5.8 km., pure benzole 7.1 km., one part benzole and one part alcohol 7.5 km., one part benzole and two parts alcohol 7.2 km., one part benzole and three parts alcohol 7 km., one part benzole and four parts alcohol 6.6 km., one part benzole and five parts alcohol 6 km., pure alcohol 5.4 km. It is clear, then, that the mixture producing the best results is one part benzole and one part alcohol.

The Norton Post-war Policy.

Mr. J. L. Norton has in hand drawings of a four-wheeled passenger runabout on motor cycle lines, utilising the Norton Big Four as a power unit; also alternative designs for rear springing of the Norton motor bicycle. These designs have not progressed beyond the drawing office, and are merely referred to here to show that the firm do not intend to allow the grass to grow under their feet as soon as they are able to turn their attention to experimental work.

With regard to the firm's post-war production, it has been practically decided to confine their efforts to two types—the Big Four, built with a high clearance for all weathers and purposes, and with enclosed all-chain transmission; and a purely sports model, with single gear ratio or with Philipson pulley.

THE MOTOR CYCLE AVIATION SECTION

EARLY REMINISCENCES. A TEN-MILE TAXI. AIRWOMEN.

On the Grand Scale.

One correspondent recently reported that there were three hundred Allied machines in the air simultaneously on one short sector of front during the April fighting.

◆

New Honours.

The King on his birthday instituted the following new flying decorations: The Distinguished Flying Cross, the Air Force Cross, Distinguished Flying Medal, and the Air Force Medal. Since the New Year Honours were published, 22,600 decorations have been conferred on officers and men in France and Flanders.

◆

Ply-wood on Hun Machines.

Visiting the Agricultural Hall the other day, we noticed that the leading edge of several German planes is kept true to contour and prevented from sagging by ply-wood extending as far back as the main spar, both above and beneath. The spars of the Fokker triplane wings are built up largely of ply-wood by a box method of construction, which is much lighter than solid ash.

◆

Marcel Hutin's Son Wounded.

The name of M. Marcel Hutin is well known throughout the British Empire as being that of one of the most brilliant French journalists and war commentators.

We note that his son, Roger Hutin, was very severely wounded on May 31st while engaged in bombing the German lines, just after he had destroyed an enemy machine. In spite of the seriousness of his wounds, Cpl. Hutin was able to bring his machine back to French territory. For this act of bravery he has received the Military Medal and the Croix de Guerre.

◆

The First Flying Meeting.

The official programme of the first flying meeting held in England is amusing reading in these days. Many will remember the fiasco at Doncaster in 1909, and recollect the weary wait to see the planes try to overcome the force of gravity. In those days the experimental machines clung lovingly to mother earth—too tenaciously at Doncaster during that memorable October week.

The code of signals was amusing, among them being signs denoting "the machine which is going to start is making a trial trip," "machine partly broken, tester not hurt," "a breakdown to motor prevents starting," "120 feet altitude reached," and so on.

The Longest Taxi on Record (?)

The *Palestine News* reports that a British aviator was forced by engine trouble to land ten miles inside the Turkish lines. His engine was misfiring, but produced sufficient power for taxi-ing and short hops but not for flight; presumably the valves of two or three cylinders had broken or stuck. Anyhow, the pilot did not give up hope, and succeeded in taxi-ing the whole way to the British lines over the level sand. *En route* he crossed a Turkish encampment, and his undercarriage brought away a clothes line and a number of Turkish shirts. The pilot was attacked by several detachments armed with rifles and machine guns, but they invariably fled when he charged the gun. Two or three German pilots dived and fired bursts at him, but luckily hit no vital part.

◆

AIRMEN MOTOR CYCLISTS

Jan Olieslagers, of the Belgian Army, who has just been credited with felling his sixth Hun plane, is the erstwhile pacing motor cyclist who created wonderful records on the Continent nine or ten years ago. Just as he was the crack motor cyclist of Belgium in those days, he is the leader now of the Belgian air fighters.

Jan Olieslagers, of the Belgian Air Force.

The R.A.F. House Magazine.

The Royal Air Force House Magazine is not to be. Final approval was not forthcoming, and, consequently, the amount received in subscriptions is being handed over to charitable institutions.

◆

Talk of Sparking Plugs!

Some most wonderful results are now being obtained from British-made plugs on aero engines. When peace days return, plug troubles on motor cycles should prove an absolute rarity.

◆

Trimming Winches.

Some modern aeroplanes, especially those of great size, are equipped with trimming winches, by means of which the pilot can set the controls permanently to correct a tendency towards nose or tail heaviness, or to flying with one wing down, thus relieving his muscles of the strain of holding the machine.

◆

The Late Lt. F. M. C. Houghton.

We have received further details of the sad death of poor Frank Houghton, to whom we referred in the Aviation Section in last week's issue.

He was flying a "Camel" single-seater scout on an important test, a type on which he was very proficient, and also very keen to fly. "He was doing valuable work at the time," so his C.O. writes, "and was killed instantaneously, his machine hitting a tree at full speed. He had been writing figures recording the results of his observations, certainly within a minute or two of his death. He was a very popular officer, and we all feel his loss."

◆

Women Pilots.

Mrs. Clarence Winchester, wife of the well-known writer on aviation matters, thinks that women can make quite good pilots. She is of the opinion that anyone who can ride a motor cycle or drive a car ought to make a good pilot, and she quotes that motor cyclist of early days, Mrs. Maurice Hewlett, and two other lady pilots, Mrs. de Beauvoir Stocks and Mrs. Buller, while we may also add the name of Mademoiselle Hélène Dutrieu, who was one of the first ladies to fly.

In the *Daily Mail* Mrs. Winchester expresses an opinion which we have seen stated before, namely, "that horsewomen should make even better airwomen, as there is no finer training for the air than horse riding." This is an opinion with which motorists will find it hard to agree, though, of course, it may be perfectly true.

FLYING FACTS AND THEORIES.

Variable Camber and the Speed Range.

By W. G. Aston, A.F.Ae.S., A.M.I.A.E.

An aeroplane "stalls" when it reaches a certain minimum speed because for its support the angle of incidence of the main planes has had to be increased to such an extent that the streams of air refuse to follow their upper surface. This first of all very considerably reduces their lift, and, secondly, enhances their drag, with the result that two agencies come simultaneously into action, the combined effect of which is an immediate loss of support.

Just as a human being, whilst suffering no discomfort from a gentle push—which is simply a slow rate of acceleration—objects very strenuously to being run into by a motor car and becoming the victim of a very rapid acceleration, so particles of air which will behave in quite a docile manner if treated tenderly become, when handled roughly, fractious, contrary, panic-stricken, and thoroughly disobedient. They *must* be humoured; persuasion, not force, is the only policy; and the aeroplane designer must therefore approach the problem of their efficient deflection with considerable diplomacy. He has to bear in mind in scheming out his plane contours that, although he can bend more or less to his will those air particles which flow along the under side, their fellows which follow the top curvature are susceptible only to cunning coaxing. Let him, or the pilot, make the angle of deflection too sharp by but one degree, and these independent gentry will promptly go on strike. When they lay down their tools, as it were, the machine stalls.

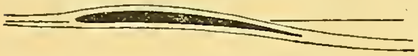


Fig. 1.

The Contour for High Speed.

Now it is highly desirable that an aeroplane should be both fast for covering distance and slow for landing and getting off the ground, as well as to give the aeroplane the capability of keeping up in case of partial engine failure. For the first purpose a small angle of attack is essential, otherwise the main planes will offer too much resistance for the engine to overcome, and that being the case it follows that the curvature, or camber, of the planes must also be slight, otherwise the air particles will refuse, in view of their speed, to be coaxed into following it. Thus we get, as set out in diagrammatic form in fig. 1, the sort of plane section and angle suitable for highest speed. It will be seen that it is very nearly flat, and that the leading portion is practically parallel to the line of air flow. The curvature also is such that the air is gently—that is to say, progressively—deflected downwards. The acceleration being "comfortable," so to speak, the air does what is required of it and follows the plane contour fairly faithfully.

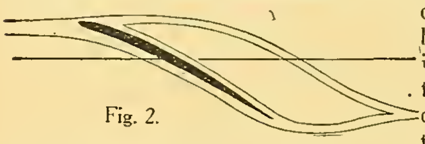


Fig. 2.

Low Speed Flying.

Now supposing we apply the conditions of low-speed flying by setting this same plane at a much bigger angle, as shown in fig. 2, the downward acceleration imparted to the air is now very rapid, the air becomes uncomfortable and refuses to follow the top surface. At the same time that which impinges on the lower surface is deflected very violently. The result is that lift is greatly diminished, and drag is immensely enhanced.

Keeping the angle of incidence the same, these conditions can be much ameliorated by altering the camber and making the section somewhat as shown in fig. 3. The change in curvature now allows a gentle treatment of the air, for once more the acceleration is relatively slow, and, what is of even more importance, it is progressive. The coaxing method is now in evidence, for not only will the air now consent to follow both surfaces, but when finally dealt with, it will have a more directly downward flow than in the previous case. In short, the lift of the plane will be increased, whilst the drag will be reduced.

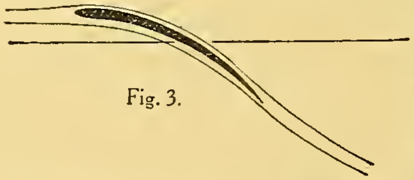


Fig. 3.

It is obvious from the above simple considerations that the ideal aeroplane must embody some contrivance whereby the camber can be varied in flight so that all conditions of speed and power can be complied with in the best possible manner.

The Advantages of Variable Camber.

It may not be generally realised, but it is none the less a fact, that, even with such power plants as exist at the present day, machines could be made to attain a speed of over 250 miles an hour on the level, but as in the absence of variable camber this would mean

Flying Facts and Theories.—

a minimum landing speed of about 150 m.p.h., it is sufficiently clear why they have not been actually produced. They would be unquestionably flyable, but their successful landing would require a Burroughs and Watts aerodrome about the size of Richmond Park, to say nothing of extraordinary skill on the part of the pilot. Given, however, an adequate variable camber mechanism, and the landing speed could be reduced to 60 m.p.h. or thereabouts—a speed rather less than that often employed at the present time.

Is a Variable Camber Realisable?

It is only fools who say that any engineering feat is impossible; whilst therefore one can safely say that the solution of the variable camber problem is an exceedingly difficult one, it is certainly too much to say that the obstacles are insuperable. A brief consideration of the conditions to be fulfilled will suggest the compression strength of the nut to be cracked. The plane section at all cambers must be perfectly rigid; both upper and lower fabric surfaces must be taut and smooth in curvature; the mechanism must be immensely strong, extremely light in weight and certain in action; the centre of pressure of the plane must be disturbed as little as possible; the rigidity of the whole wing structure must not be impaired; the variation of the camber must be accomplished fairly quickly and be completely under the control of the pilot. The inventor who successfully solves the problem will deserve the thanks of airmen and a place in the history of aeronautics.

A Ford Post-war Aeroplane?

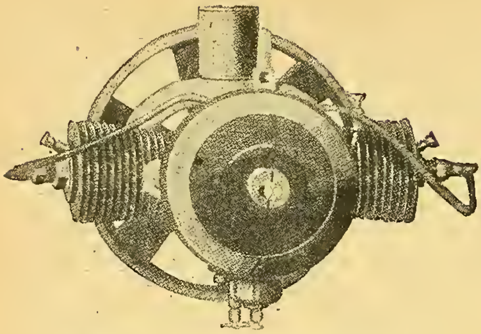
A Future Order:

"Please send me one of your Aeroplanes, for which I enclose cheque for £100."

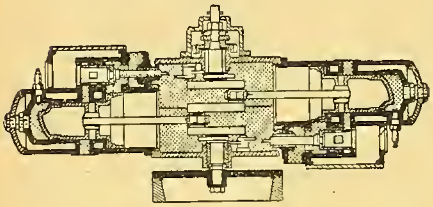
As Henry Ford has been the fairy godfather of impecunious motorists, so he may yet prove to be the consolation of the man of moderate means, who thirsts to own his own aeroplane. At recent exhibitions in Trafalgar Square some of us saw the world's smallest aeroplane, which is presumably obsolete and a washout for war purposes, or it would never have been stuck up for all the world and his wife, including uninterned Boches, to take notes of. But I noticed with interest that it was propelled by a glorified motor cycle engine, made by a motor cycle engineer. I saw no reason why such an engine should use much petrol per hour, or cost more than £30 to make in quantities. Henry Ford could surely turn out this 'bus in quantities at between £100 and £150 a time. Its wings could be taken off, if so designed, by knocking out a couple of pins on each side, and slipping a bracing wire or two. The whole 'bus could then be housed in an ordinary light car garage. As the dear old training "Rumpety," or Maurice Farman, does its 80 m.p.h., this wee plane should be fast enough for ordinary purposes, since it carries no weight, and its lines are clean. Moreover, being well powered for its weight, it should get off the ground with a very short run, and the private owner's one problem with it would be to find a safe landing place, until such time as the police allow us to use quiet suburban roads for the purpose. Oh dear! Why was not I born forty years later? All the real fun lies ahead.

D.

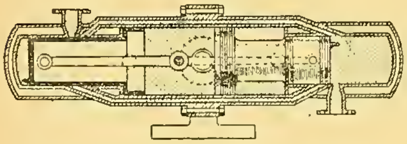
With the American Expeditionary Force in France. American mechanics assembling 'planes at an aviation school in France. (*Official.*)



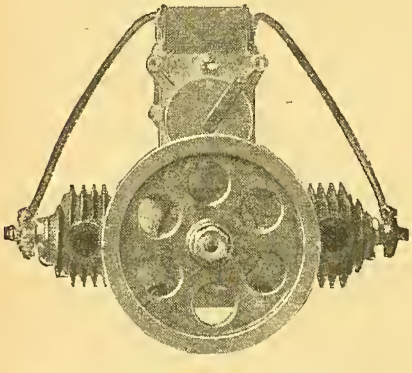
The flat twin two-stroke engine of the American Greyhound cycle car, which, with friction transmission, it was intended to market at a figure in the neighbourhood of £50. Note the fan opposite the flywheel.



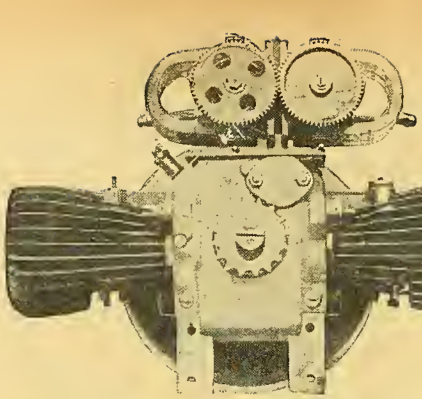
The M.I.P., which has 180° cranks and embodies truncated pistons and piston valves. Crank case compression is used for scavenging only, the mixture being admitted to the working cylinders by rotary or piston valves.



The Victoria, probably the first of the flat twin two-strokes. Truncated pistons are used to provide the initial compression, the lower half of one cylinder acting as a pump for the other cylinder. A single-throw crank is embodied.



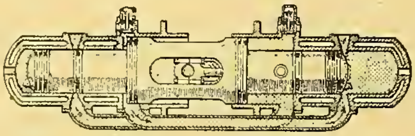
The Dwarf engine, a flat twin two-stroke designed for an ultra lightweight motor cycle, which it was hoped would weigh no more than 70 lb. The design embodied mechanically operated exhaust valves.



An experimental Douglas two-stroke flat twin built six years ago. Note the twin magnetos geared together.

It is a common mistake among those who do not closely follow the mechanics of the motor cycle engine to suppose that any two-stroke engine, because it fires on every down stroke of the piston, must necessarily split up the torque of a similar engine of the four-stroke type. The majority of flat twin two-strokes have, however, a torque similar to that of a four-stroke engine of the same general type, such as the Douglas.

To explain this to the uninitiated a chart is given herewith. The vertical lines in this chart each represent 90°, therefore four of them represent 360°. The dark dots indicate the firing instant, the horizontal lines show the intervals between explosions in each cylinder, and the heavy lines the firing intervals of the complete engine. From the chart it will be noted that, while the two-stroke single has intervals of 360°, exactly half those of a four-stroke single, the flat twins with 180° cranks (which is accepted practice) are exactly alike, because in both cases the pistons are at the top of their stroke together, but in the case of the four-stroke the cylinders fire alternately, because two revolutions are required to complete the cycle.

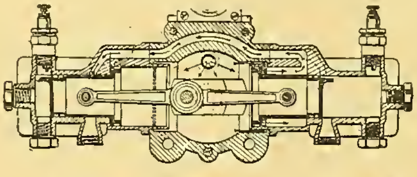


The Rankin-Kennedy engine, having two truncated pistons connected together and employing only one connecting rod. The crank works inside the sleeve connecting the pistons, which is slotted at each side for the shafts.

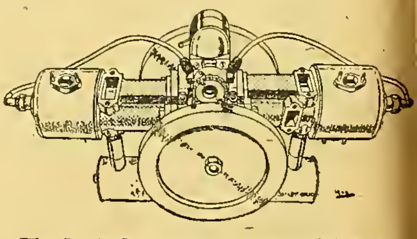
Flat Twin Cranks.

In the case of the vertical twin the firing torque, so bad in the four-stroke type, is converted to one equal to that of a four-cylinder four-stroke by the introduction of the two-stroke cycle.

To obtain this result in a flat twin it is necessary to have a single crank throw, which means that the



The Duttlinger engine, a recent French patent, in which truncated pistons are embodied, drawing their charges of gas from the crank case through ports exposed at the bottom of the stroke.



The Levis flat twin as a water-cooled engine, intended for small cycle cars.

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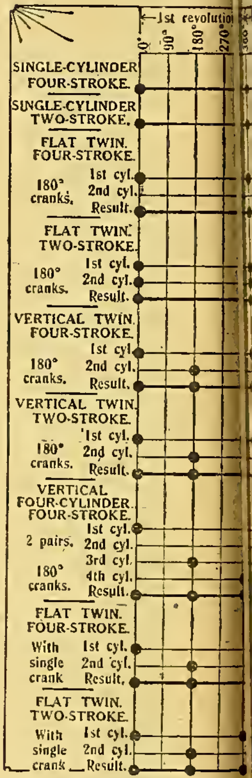

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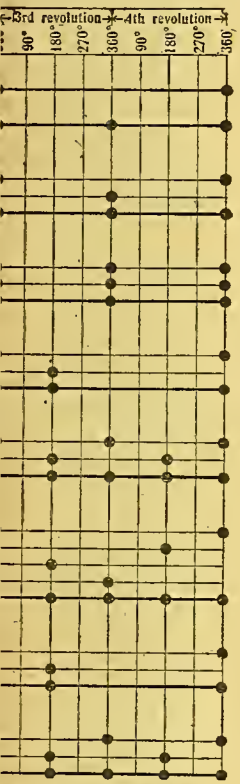

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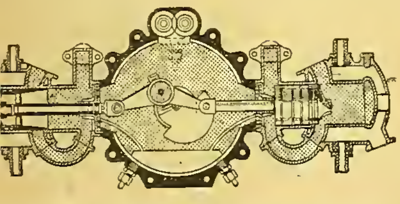
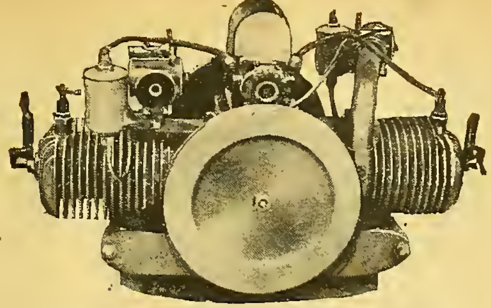


The Wilks-Hartshorn engine, embodying
ton rods, "sealed" cylinders, and automatic
et valves. Crank case compression is obviated.

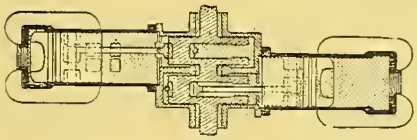


The Levis, which has 180° cranks. Probably the only engine of its type in use by His Majesty's Government for purposes of war. Note the two flywheels and separate carburetters.

does not vary, hence means have to be employed to provide initial compression for each cylinder separately. It will be seen that in the Kimberley design a blower is used, while in the Wilks-Hartshorn engine the ends of the cylinders are closed and piston rods embodied as in steam engine practice, while in the Duttlinger patent truncated pistons are used. In the Spencer patent specification, the crank case is shown as being divided to provide a separate compression space for each cylinder.

Balance and Torque Again.

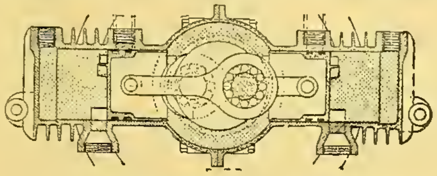
When everything is considered, it is not surprising that many designers of flat twin two-strokes have been prepared to sacrifice the more even torque of the conventional four-cylinder engine, given by the flat twin two-stroke with 360° cranks, to obtain the balance advantages of the flat twin with 180° cranks.



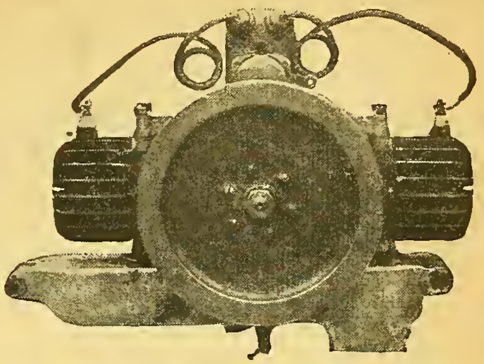
The Spencer design, which may best be described as two single-cylinder engines with their crank cases reversed and placed side by side. The impulse effect is the same as an engine having a single-throw crank.

One is constrained to ask, Why introduce a flat twin two-stroke if the firing torque is only the same as the four-stroke, which is regarded as a superior cycle? The answer lies in the fact that in the four-stroke engine the power is given off at each end of the engine alternately. In the two-stroke engine of this type, both cylinders fire simultaneously. Therefore, a perfect two-stroke flat twin should be nearer to the ideal than a perfect four-stroke engine of this type.

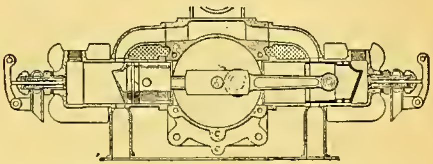
In the minds of the majority of designers the greatest advantage of the two-stroke engine is its simplicity on account of the absence of valves and



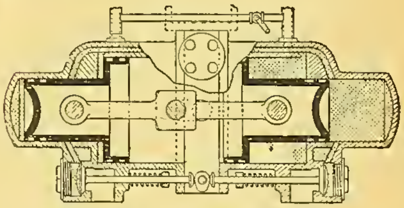
The Roots design, the main idea of which is to reduce the number of parts. It will be noticed that the crank case is formed by extending the cylinders. Staggered connecting rods are used, permitting the cylinders to line.



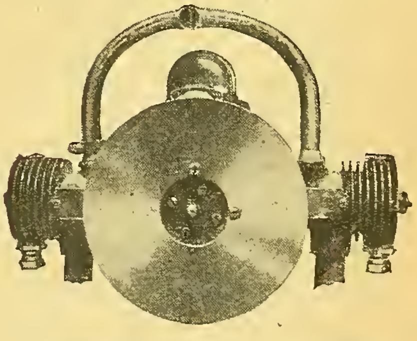
The Connaught engine, which, like the Levis, has 180° cranks. The transfer passages are formed in the magneto platform, which is also the crank case cover. Note the aluminium box-shaped silencer by which the engine is carried in the frame.



The Kimberley engine, designed for the James Cycle Co., Ltd., another engine with single-throw crank. In this design initial compression is provided by a blower pump, which is part of the crank case.



The Rowe engine, a recent patent embodying truncated pistons and a single-throw crank. The invention includes mechanically operated exhaust valves. In the transfer pipes there is a rotary valve by means of which the whole or portion of the compressed charge in either of the pump cylinders may be conducted into the other compression space instead of into the cylinder, thus permitting the power output of the engine to be varied at will.



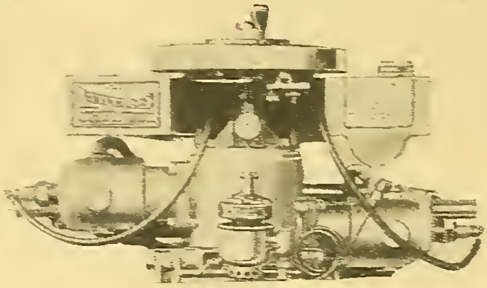
The Bullet engine, which embodies separate cranks connected by means of a dog clutch in a central bearing, which divides the crank case into two separate chambers for initial compression.

The Flat Twin Two-stroke.—

valve gear. Several recent designs, however, embody valves, both of the poppet and rotary types.

There are several difficulties for designers and makers to overcome. It may be remembered that the Scott racing engine has a rotary valve to distribute the gases, under compression in the crank cases, equally to the two cylinders. With the flat twin the conditions are not exactly the same, but the need for some such device appears to have been appreciated by more than one designer of a flat twin two-stroke. Again, the ignition problem is not easily solved with this type of engine, since it is necessary to provide two sparks absolutely simultaneously, and probably the double pole plug may be of assistance at this point.

At the time war broke out plug and magneto experts differed as to whether it was advisable to use a double pole plug. The magneto makers affirmed that this system of ignition placed undue strain upon the magneto. It will be noted from the illustrations that Messrs. Douglas Bros., in their experiments with flat twin two-strokes, fitted two magnetos. The greatest efficiency is hardly to be expected from these methods, while the setting of the magnetos must have called for almost superhuman patience and perseverance if anything near the possible maximum efficiency were to be obtained.



The Evinrude portable boat engine, a representative of many such engines used for marine purposes in the United States. Note the staggered cylinders.

The accompanying illustrations show some of the designs of flat twin two-strokes, while several are from photographs of engines that have been made.

At least one engine of this type is in use by His Majesty's Government, and, no doubt, we shall hear more of this when the war is over. In the meantime, it is interesting to take stock of the various existing designs, from which we may be able to judge the trend of thought behind what may be a standard type of motor cycle engine in the future.

THE "BEST" GEAR RATIO.

Some Opinions on a Rather Controversial Subject.

FEW riders seem to realise the fact that as a petrol motor depends for its power on the number of revolutions per minute at which it runs, a lower gear gives a greater output of power than a high one. To take an example, suppose we have a 3½ h.p. engine which when geared 4 to 1 gives 4 h.p. on the back wheel, if we lower the gear to 5 to 1 the h.p. with the same throttle opening will now be very nearly 5 h.p. The question now is, what is the best ratio to use in practice, and the answer to this depends on whether the rider requires the best *average* speed, *i.e.*, the maximum distance covered in a given time, or merely the best *maximum* speed for a short distance.

The low-geared machine will give the best average speed because its greater number of revs. means a greater power output, and also because it will take most hills "on top" instead of having to change down to an unnecessarily low gear, as would be the case of a high-geared machine. If we assume that on average "give and take" roads, two-thirds of distance covered in a day will be either level country or uphill, it follows that a low-geared machine will score over two-thirds of the distance, whilst a high-geared machine will only score over one-third of the distance, *i.e.*, when running over down grades.

Conclusive Experiments.

Some years ago I carried out a number of experiments with a well-tuned 5½ h.p. combination, fitted with a hub gear and Philipson pulley. This arrangement gave practically any gear between 4 to 1 and 14 to 1. I found that with a top gear of 4 to 1 the engine was practically useless, except in down grades—it had "no life," and the pull was extremely jerky. The prejudice against "one lungers" in many quarters is due very largely to the fact that most sidecar combinations are sent out by makers very much overgeared; if properly geared the torque of a well-balanced single is good enough for anyone outside of a sanatorium (or asylum). As a result of the experiments, I proved conclusively that the best gear for a moderate-powered combination was 6-6¼ to 1 for top gear, and such a gear gave *best average speed over a long run.* The low top gear also means far more flexibility and longer life of engine bearings.

So long as we have a speed limit of 20 m.p.h. in force it is absurd to send out machines geared for excessive speeds—only, in fact, fit for the track. The low-geared machine will make by far the best all-round combination for touring work, which is what most sane riders require.

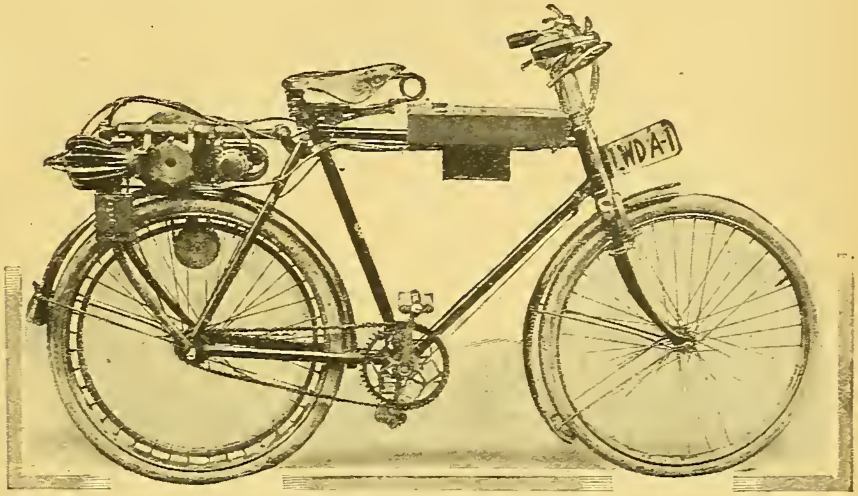
Summary.

The same argument, of course, applies to pedal cycle gears, and the man who uses a single gear of, say, 120in., although he can make good time downhill, or before a gale of wind, will *not* be able to cover as much ground in a day as a rider on a low-geared machine. To settle, once for all, the question of "best" gear, therefore, it seems to me only necessary to grasp the two facts mentioned: (1.) That power output depends on *number* of revs. per minute. (2.) That two-thirds of distance covered in a day is either level or uphill work, and so to the advantage of a low-geared machine.

When a large twin is used for solo or light sidecar work it is, of course, advisable to gear higher, for the simple reason that maximum possible power output is seldom or never required. My arguments refer chiefly to the 4-6 h.p. combination. M. HITCHCOCK.

THE ZEPHYR MOTOR ATTACHMENT.

AN IMPROVED MODEL.


The improved model Zephyr motor attachment. The engine is a two-stroke of 1¼ h.p.

It was in the issue of November 18th, 1915, that we first described the Zephyr attachment, which is handled by the London and Westminster Industrial Syndicate, Ltd., 8, Victoria Street, London, S.W.1. The outfit then underwent a considerable amount of development, and was again described in the issue of February 22nd, 1917—a description which went at considerable length into the method of carrying the engine and the transmission—but since that date the Zephyr has been still further improved, and now has reached the stage at which it may be said to have attained practical finality in design.

The engine was originally attached to the luggage carrier, but it was found that it can be more conveniently and more simply carried on a single tube extending from a lug clipped on to the top of the saddle tube of the bicycle frame. It is fastened on to the lug by means of a bolt, and at the rear end, as can be seen from the picture showing the carburetter side, it is suspended on a telescopic spring device which acts as a shock absorber. The engine is finally supported by means of a supplementary pair of forks, as clearly shown in the illustration.

The engine is a two-stroke, 2$\frac{1}{16}$in. (52½ mm.) bore and stroke, and develops 1¼ h.p. Larger radiating fins, so as to assist cooling, are now fitted and there have been slight modifications in design. In this engine, the gases are transmitted from the crank chamber to the combustion chamber *viâ* a port in the piston. The exhaust port has also been brought a little to the rear.

Mr. H. B. Molesworth, M.Inst.C.E., the well-known engineer, who is acting as consulting engineer to the Syndicate, informs us that the engine has been greatly improved both as regards flexibility and power.

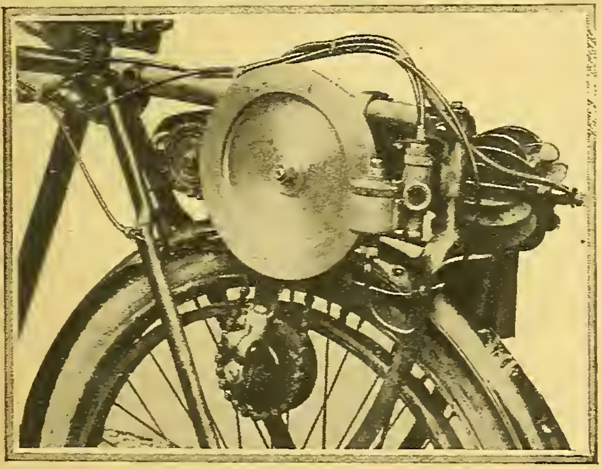
An Interesting Transmission.

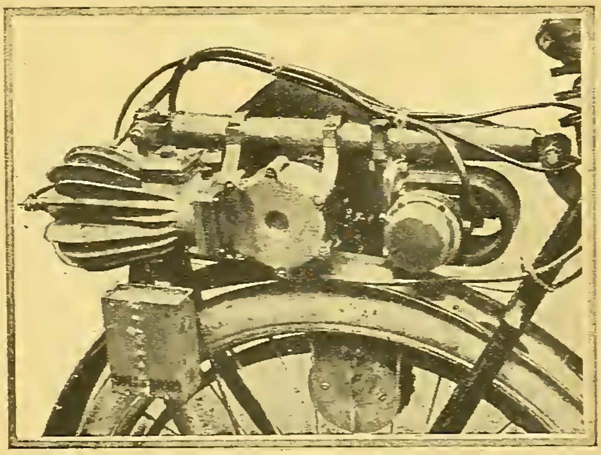
It may be remembered that a most interesting feature of the Zephyr attachment is the transmission, and in this a slight improvement has been effected. There is now no shock absorber on the transmission pulley, which is driven by chain from the engine and hung on a swinging arm, and, instead of a take-off spring being provided, a large Bowden lever controlling two wires, the action of which is to swing the pulley backwards and forwards, is clipped on to the off side of the handle-bar. When the pulley is pushed forward it is in the position in which the back wheel can best rotate the engine and start it. The central position is neutral, while if the lever be pushed forward so as to bring the pulley to the rear the drive is communicated from the engine through the belt rim to the back wheel. There is a tendency for the friction wheel to run towards the rear of the bicycle against the belt rim, and, in consequence of the jamming action, sufficient drive is attained to transmit the power of the engine to the road wheel without slipping.

The engine is lubricated by the petroil system, and the tank shown on the top tube is not in the normal position, as in future models it will be carried over the engine and all control wires will be hidden.

The attachment might be adapted to bath chairs so that one wheel could be driven by the motor and the chair steered by means of a tiller.

We tried the machine for a short distance and found the engine capable of attaining a high number of revolutions; but we would suggest that the control be arranged in the standardised fashion, namely, the transmission control on the near side of the handle-bars and that for the carburetter on the off side. The engine has no compression release, consequently the control is entirely by the throttle and air levers.


Carburetter side of the Zephyr power unit. The shock absorber is immediately behind the carburetter, interposed between the supporting tubes and the auxiliary fork.


The engine is suspended on an arm, one end of which is bolted to a special lug beneath the saddle, the other end being bolted to an auxiliary fork.

MILITARY NOTES.

DEATH OF CAPTAIN BUSBY—A PIONEER DESPATCH RIDER.

MILITARY CROSS FOR A FORMER D.R.

CAPT. H. H. BERLANDINA, R.E., has been awarded the Military Cross for services on the Italian Front. Capt. Berlandina was a despatch rider with the original army in France.

* * *

THE LATE CAPTAIN VERNON BUSBY, R.A.F.

WE have a very sad duty to perform in recording the death of Capt. Vernon Busby, R.A.F., who was killed accidentally while flying near London recently.

Capt. Vernon Busby, R.A.F., who was killed whilst flying.

Capt. Busby was one of our best known motor cyclists, and before the war was the skilful rider of a 3½ h.p. Sunbeam and other machines, and was connected with the Aston Motor Accessories Co., Ltd., the manufacturers of the Amac carburetter. He was a consistent performer in competitions, and a well-known *habitué* at all the Brooklands motor cycle race meetings.

When war broke out (as he was in the Special Reserve he was, of course, mobilised at the outbreak of hostilities) he was sent with a number of other motor cyclists to Ireland, and Busby was the first wounded despatch rider we visited after the Battle of Mons, and at Le Cateau he was accidentally wounded by a rifle bullet. At that time he was a corporal, R.E. Signal Section, and for more than a year he continued in this branch of the service, eventually being granted a commission, and finally ending his career in the R.E.'s by being appointed one of the officers at an R.E. training centre. Then he was transferred to the R.A.F., and for some time suffered from exceedingly bad health, but he eventually recovered and later became a pilot, and it was while acting in this capacity that he met with his sad end.

His accounts of the early fighting were distinctly interesting, and in our first interview with him he described how motor cyclists during the retreat were instructed to go out in pairs, with one hand on the handle-bars and the other carrying a revolver, while orders were given to them to cut telegraph wires as the troops retired.

Capt. Busby will be sorely missed in competitions when motor cycling again becomes general. His war record was one to be proud of, and he certainly did yeoman service in developing the motor cycle prior to the war.

* * *

D.R.'s OF THE R.G.A.

A GUNNER of the —th Siege Battery of the Royal Garrison Artillery writes to us under the *nom-de-plume* of "Venus." He discusses the relative hardships of the despatch riders attached to the Artillery and those of the Royal Engineers.

He says: "I have been a most interested reader of your most excellent journal *The Motor Cycle* for the last four years, and noticed how frequently the despatch riders of the R.E.'s are mentioned. There are other D.R.'s in France who deserve mention also. Every Siege Battery in France has with it two combinations and two solo machines. The Heavy Artillery Groups or Brigades have about two solos. The combinations are either Clynos or the Douglas 4 h.p. The solos are either Triumph or the Douglas 2¾ h.p.

"A few batteries are allowed A.S.C. D.R.'s, but nearly all batteries prefer their own men. The Battery D.R.'s are all issued with clothes, waterproofs, leggings, etc., exactly similar to the famous R.E. D.R.'s.

"The respective 'cushiness' of these jobs is often discussed: the R.E. anywhere between Rouen and the Corps H.Q.R.S., or the R.G.A. who rides between the heavily shelled battery positions and the Brigade H.D.R.S. or Heavy Artillery Groups, where the roads are without repair and badly shell-holed.

"Another little item is that the R.E. gets an everyday opportunity of getting small repairs executed and broken parts exchanged. Now, the R.G.A. D.R. has anywhere between four and forty kilometres to go, according to his Front, before he is able to get the necessary at his workshop (A.S.C.).

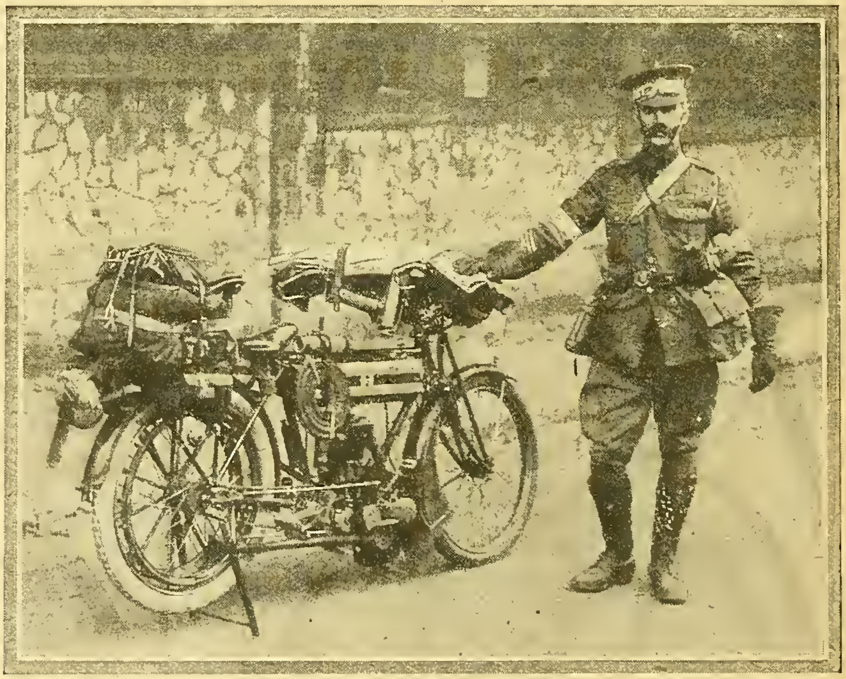
"In fine, all we ask is that when people talk of D.R.'s, do not forget that there are other units in France beside R.E.'s who do risky and useful D.R. work.

"I wish the 'Blue 'Un' every success as a most top-hole journal."

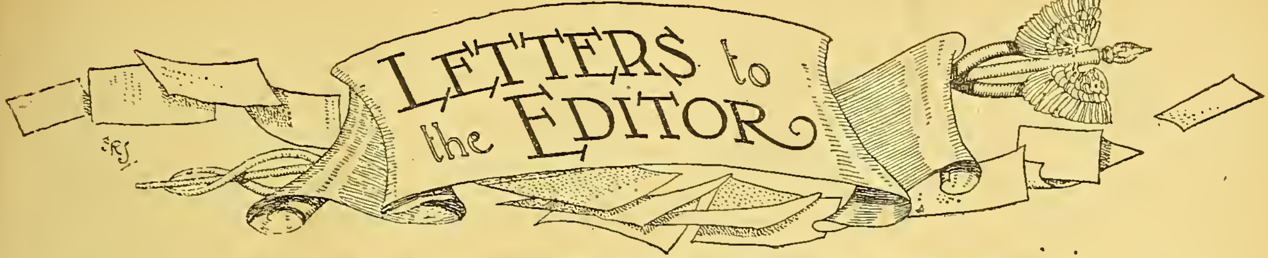
* * *

VETERAN MILITARY MOTOR CYCLIST.

WE have received a few particulars concerning Lt. Longley, who has had thirty years' continuous service in the Royal Engineers, and was among the first to see the possibilities of despatch riding on motor cycles. He went out with the original Expeditionary Force in 1914, and fought from Mons to the Marne. Then forward again to the swaying struggle and imperishable glory of Ypres. He has since obtained a commission, and is still on active service. The photograph we reproduce shows Lt. Longley (at this time he was a sergeant) with a Triumph and full kit ready to leave for France in 1914.



Lt. Longley, R.E., with full rig, about to leave for France as sergeant in 1914. He was one of the first to conceive the idea of motor cycle despatch riding.



LETTERS to the EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address.

DIFFICULT STARTING.

Sir,—As a B.S.A. rider, I would like to thank Mr. Ellison for his letter, and would suggest that the B.S.A. Co. reproduce his instructions as they stand in their booklet. In future the recording angel will find a material decrease in his labours so far as I am concerned! Any more tips from Mr. Ellison would be welcome. GILBERT ELLIOT.

TIMING MECHANISM.

Sir,—With reference to the most interesting article on "Timing Mechanism" on page 488 of *The Motor Cycle* of May 23rd, I should like to point out that the Bradbury engine is incorrectly classed. This engine is mentioned in Group 3 as having "two cam wheels with *external* cams," whereas it embodies two cam wheels with *internal* cams, and should therefore come under Group 4.

D. J. McDOUGALL.

STUNT FLYING.

Sir,—The sketch on page 569 in the issue of *The Motor Cycle* for June 13th, which purports to illustrate an aeroplane rolling, is so inaccurate that I cannot refrain from offering a protest. This picture shows the aeroplane simply rotating on its fore and aft axis, which is not the case in actual practice. If it were so, then it is obvious that during this manœuvre centrifugal force would tend to throw the pilot out of his machine, whereas, as a matter of fact, during the roll the pilot is actually held in. As I pointed out in my article some six weeks ago, a roll is practically a loop pulled out axially, and therefore involves control on the elevator as well as on the ailerons. Since "Torque" has not mentioned this point, his description is apt to be misleading. W. G. ASTON, A.F.Ae.S., A.M.I.A.E.

R.A.F. MECHANICS.

Sir,—For the sake of the "butcher, baker, tinker, and tailor" who wish to be classed as technical, I will define a mechanic. He is a man who can do turning, fitting, planing, milling, toolmaking, hardening, tempering, and (if necessary) pattern-making and carpentry. Can any of your correspondents claim these abilities? In my opinion, only those qualified in the above can claim to be air mechanics; the rest should simply be plain privates. As to their own repairs, many a man in pre-war days did his own repairs, but in profession was in any trade other than engineering, and would not have cared to have been described as a mechanic. In writing this letter, I am voicing the opinion of other mechanics, all of us old hands, and not war-time mechanics. Hoping your correspondents will deal leniently with us, FIVE PRE-WAR ENGINEERS.

London, S.E.

A TIP FOR TIMING A TWO-STROKE.

Sir,—I often see queries in your paper *re* the timing of two-strokes. Naturally, the retiming of these interesting little engines is always attended with some anxiety, as a few millimetres either way means a lot to an engine with 2,000 firing strokes per minute. Some of the newer machines have an indication mark on the outside flywheel which simplifies the matter immensely. Riders of older machines of the two-stroke variety, however, whose machines bear no such mark, would find the following "tip" useful for testing the timing:

With the machine on the stand, inject a little petrol, and fire off by pulling over the back wheel by a firm hand grip on the tyre in the usual way. If the timing is correct the wheel should be fired *backwards* out of the hand with the ignition lever in every position except fully retarded, in which position (only) the wheel should be fired forwards. Keep clear of the mudguard with the wrist, or a nasty cut is the result.

It takes a bit of fiddling sometimes to get this result, but the time is well spent, and results in a cooler engine, greater speed, more power on hills, and improved consumption of fuel and oil. J. DODD.

THE FOUR-CYLINDER F.N.

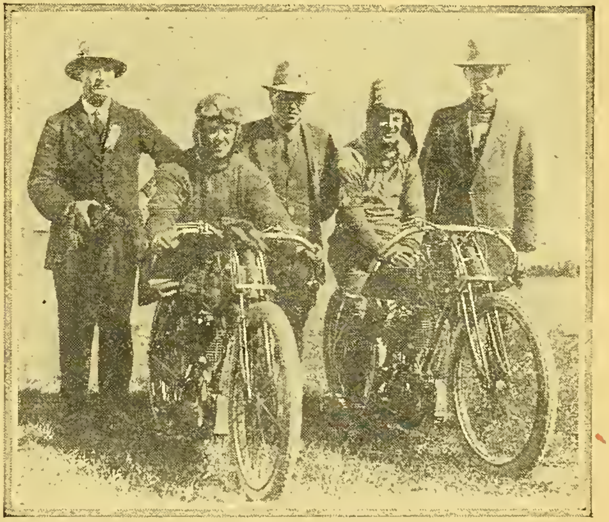
Sir,—In reply to "Canterbury" in *The Motor Cycle* of June 13th, the F.N. could be obtained fitted with gears of approximately 5¼ to 1 and 10½ to 1 for solo use, or 6 to 1 and 12 to 1 for sideacr work. With the 5¼ to 1 gear a speed of 56 m.p.h. can be *touched* when the engine is in good order, but 45 m.p.h. is the usual limit for any distance because of the automatic inlet valves. With the 6 to 1 gear a speed of about 50 m.p.h. for a short distance or 40 m.p.h. sustained is as high as can be expected. W.B.

Sir,—I have pleasure in replying as follows to the queries of your correspondent "Canterbury," *re* four-cylinder F.N.

The gear ratios of 5.9 and 11.8 to 1 on his machine are intended for sidecar work. The solo gears are 5.4 and 10.8 to 1, though the first mentioned are quite suitable. If he wishes to change the ratios it can only be done by altering the two gears in the bottom bracket which carry the drive from the clutch out to the gear box. He will find these now have seventeen and twenty-five teeth. The makers supply another pair with eighteen and twenty-four teeth, which will give the required alteration.

Should your correspondent require any more information or hints on the F.N. I should be very pleased to supply it.

ERIC CAUDWELL.



Competitors in the New Zealand Red Cross Motor Carnival. The rider on the left is A. E. Woodman (B.S.A.), the one-legged motor cyclist, and winner of the middleweight New Zealand championship. Woodman, it will be remembered, lost his leg in consequence of an accident whilst practising for the 1910 T.T. races. The rider on the right is J. A. Karton (B.S.A.), second in the New Zealand championship.

CAIRO TO JERUSALEM.

Sir,—In your issue of March 14th, under the heading of Current Chat, we noticed a paragraph stating that a Church Army organiser had recently undertaken a motor cycle ride from Cairo to Jerusalem.

Would the Church Army organiser oblige with a detailed description of his ride, as, so far as we know, this is the longest motor cycle ride ever attempted over the Sinai Desert, and would be welcomed by all D.R.'s on this front, who have had experience of real sand riding?

The Triumphs out here are standing up to the work magnificently. A stronger fork spring, stronger main bearings in the gear box, and footrests further back would be welcomed by TWO PALM TREES.

Palestine.

A CURIOUS CASE.

Sir,—With reference to a letter by H. C. Cousins, R.M.A., in your issue of May 16th, I have also come across a Thomson-Bennett magneto (operated by hand for starting) which gave a spark without a carbon brush bearing on the collector ring. On examination, I found the brush holder (made of vulcanite) had a brass bush, in which worked the carbon brush. Presumably the high-tension current jumps from the collector ring to the brass bush, which must touch, or almost touch, the high-tension cable.

I notice "S.A.E.G." (May 30th) complains of his engine starting easily from cold, but not when hot. This happened to me once also, and on taking down the magneto I found that water had got inside, all round the armature. Exactly why the engine started easily from cold, I do not know, but a thorough drying of the magneto parts cured the trouble. G. BAGSHAWE.

B.E.F.

THE POINT OF MAXIMUM EFFECTIVE PRESSURE.

Sir,—In reply to the letter of Mr. H. S. Leftwich, in your issue of May 30th, the point in question occurs when the crank has moved about 30° from the top dead centre.

This is the point at which the *turning moment* on the crankshaft reaches its maximum value. As the crank rotates beyond this point, it certainly gets into a more favourable position for rotating the shaft, until, when the crank and connecting rod are at right angles, the most favourable position is reached, but what is gained in this respect is more than lost by the rapidly falling pressure.

The value of 30° is given for an engine running *slowly*, so that no considerable inertia forces are generated. When an engine runs at a high speed, the inertia of the piston and connecting rod modifies the piston pressures in such a way that the maximum turning moment occurs at some angle rather later than 30°, the exact value depending upon the magnitude of the various quantities involved.

J. H. SINCLAIR.

A BAFFLING EXPERIENCE.

Sir,—With reference to the mysterious and baffling occurrence to Mr. Chapman's machine, perhaps my experience may be of assistance.

My machine, a 6 h.p. twin Bradbury (we hear little of this machine, but it is second to none) with a Splitdorf magneto, behaved in exactly the same way. Having arranged to convey a friend from here to Selsey, I was quite unable to get a start. The spark appeared quite in order, plugs clean, magneto points set to a hair. The result was nil after two hours' hard work. Next day I emptied the tank and refilled with petrol instead of half Binks and half petrol. After half an hour I eventually got a backfire, and in the end the machine ran quite well. This was after heating the plug points almost red hot in a fire. The same thing occurred soon afterwards, but a new contact maker platinum point set me right once more.

It was pretty obvious from the speedy manner in which the platinum wasted away that the magneto was wrong.

It was then sent by our local garage proprietor to London to be overhauled, and the result is marvellous—not an atom of trouble from that day to this. What was done to the magneto I do not know, nor have I enquired. The result is quite sufficient, for the cause was beyond me. I even tried another carburetter, with very poor results, returning to a B. and B. top feed. I trust this may help Mr. Chapman.

Midhurst. S 5780.

[The indications point to condenser trouble.—Ed.]

WHAT IS A CYCLE CAR?

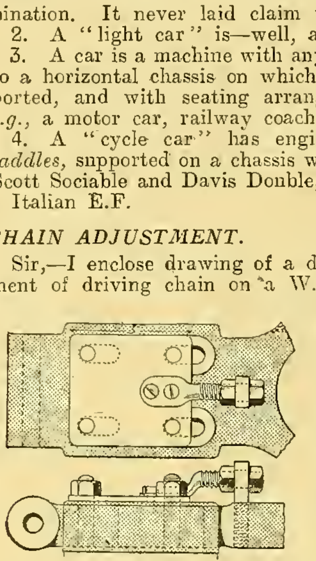
Sir,—I see "Ixion" believes in the coming of the cycle car. Does he know what a cycle car is? I have been following the struggles of a certain motoring weekly to define a motor cycle, cycle car, and light car. I am none the wiser yet from their definitions, but I know what *I* mean by a cycle car. Allow me to say first that weight, price, passenger capacity, and cubical capacity have nothing to do with the question. The deciding factor is the chassis. I have not yet seen a clear statement of the difference between a motor cycle and car. Let me clear up the point. A motor cycle has a *vertical* chassis, a car a *horizontal* one. This fact appreciated, the definition question becomes easy.

1. A "sidecar outfit" is not any one thing; it is a combination. It never laid claim to any special name.
2. A "light car" is—well, a *light* car.
3. A car is a machine with any number of wheels attached to a horizontal chassis on which the engine, if any, is supported, and with seating arrangements of the chair type, *e.g.*, a motor car, railway coach, or tramcar.
4. A "cycle car" has engine, wheels, and seats, *not saddles*, supported on a chassis which is mainly vertical, *e.g.*, Scott Sociable and Davis Double, the only instances I know.

Italian E.F. G.H.H.

CHAIN ADJUSTMENT.

Sir,—I enclose drawing of a device for the simple adjustment of driving chain on a W.D. Triumph. This is easy to make and quite within the capabilities of the average mechanically inclined reader. It is self-explanatory, gives a quick, easy adjustment, and is well worth fitting to any countershaft model Triumph. I have several machines fitted with it out here, and it is giving every satisfaction.



A device for facilitating chain adjustment.

I have been out here with a supply column since February, 1915, and the arrival of your publication is quite a weekly event. I note the post-war Indian is to be fitted with a very similar adjustment. This of mine has been on the road since January. S. GORDON BARNETT.

B.E.F.

SATISFACTORY TREATMENT.

Sir,—I should like to give the makers of my motor cycle and sidecar some well-deserved praise, both for their benefit and for the benefit of the motor cycling public, and therefore I trust you will publish this letter, and possibly give them (the makers) a slight surprise. The reason is this: Since 1899 I have owned almost every type of motor vehicle from big cars to motor cycles, but have not for some time till this year owned motor cycles again, when I bought a small 2¾ h.p. solo machine, and then exchanged it for a new war model 8 h.p. Matchless, as the other was not up to its work (although an excellent machine) on these bad roads with a sidecar. I must say that I was astonished at the advance which had been made since my 1905 N.S.U.

Now the point is this. During all these years when anything went wrong with the machinery I found the firms concerned rather aggrieved and somewhat bored at having to put things right, and generally inclined to insinuate that the fault lay in my driving or that of my chauffeur, and had nothing to do with any defect in their product. Then followed as a rule a heavy repair bill.

Now, I have nothing but praise for this latest machine of mine; it has done over 2,000 miles, and has had and required less attention than any motor vehicle I have ever possessed, but, being a bit of a Jonah, things always happen to me, and in this case I had some slight trouble with the clutch. I rang up Messrs. Collier and asked them if they could possibly put this right if I brought the machine to their works as quickly as possible, explaining that I was a busy professional man, and unable to spare the use of the vehicle. This they promised to do, and done it was with the utmost despatch. Not only that, but Mr. Collier and his foreman personally superintended the work, and thoroughly overhauled the whole combination and readjusted everything in the twinkling of an eye, and I was sent on my way rejoicing in under two hours, work having been done which would have taken any ordinary garage almost days to do. This was effected by putting a number of workmen on the job, such things as removing the sidecar body being done to see if the front springs were all right, etc. Now, this is first-class treatment, and, to my mind, is an example of how motor business should be carried on, and naturally should I ever purchase another motor cycle after the war (which I probably shall), Messrs. Collier will be the first people to whom I shall apply. The machine is now running perfectly, and, strange to say, I get as much pleasure driving this powerful combination as I did with my previous cars; also I am in much better health than when I owned a car—perhaps a coincidence, perhaps not. Needless to say, I have no connection with Messrs. Collier, and have never mentioned to them that I was going to write this letter.

CLAUDE GOULDESBROUGH, M.B.

MOTOR CYCLISTS AND THE ROYAL AIR FORCE.

Sir,—With reference to the correspondence *re* motor cyclists and the R.A.F., I hope that I shall not be encroaching too much upon the valuable space of *The Motor Cycle*—of which periodical and of *The Autocar* I have never missed one issue during nearly three years out here.

Now, it must be very heartrending to enthusiastic motor cyclists and mechanics who are in the infantry—like myself—to read of this jealousy of men in the R.A.F. I fail to see how R.A.F. D.R.'s can compare tuning up and keeping on the road a P. and M. motor cycle with a 3 ton Leyland motor lorry, and the officials who arranged the different grades knew the game and saw this. In any case, I would exchange places with any of them, and shake hands with myself, but I am not in the Army for what I can get, but to get the war over.

B.E.F. NORTHUMBERLAND FUSILIER.

AN OCCASIONAL "KONK."

Sir,—I submit the following explanation for discussion:

Action.—Detonation before dead centre on compression stroke.

Cause.—Modern petrol of low flash point in combination with high compression engine, six years old design of cooling, and, possibly, hot climate.

Remedy.—(1.) Raise flash point of fuel by using benzole. (2.) Lower the temperature of engine by *(a)* lowering the compression by placing washers under the cylinders and scraping off carbon deposit; *(b)* increasing efficiency of cooling by ensuring as big flows of air and water as possible. If possible clean jackets and radiator.

In this connection petrol is really an unsuitable fuel when used in the ordinary run of air-cooled cast iron cylinders of engines which have a high compression and which are liable to overloading and neglect. With a momentarily perfect mixture the above conditions approach too near the danger point of detonation.

W. R. DEUCHAR (Sec.-Lt., R.E.).

MOTOR CYCLISTS AND THE PETROL SUPPLY.

Sir,—Probably, like most other folk, I am distinctly puzzled to know what I may do and what I may not do under the latest Petrol Restriction Act, and if you can help me, and perhaps help others similarly situated to myself, I shall be grateful.

In February, 1917, I was granted a petrol licence for twenty gallons, which I bought. I also bought about that time approximately sixty gallons of substitute, for which I required no permit. My petrol permit was for pleasure purposes.

I came to the conclusion that rigid economy was and would be absolutely necessary, and, beyond using eight gallons during my holidays, I have strictly confined my riding to business purposes, and consequently have somewhere about thirty gallons left in stock.

I wrote to the Petrol Committee to know if I was permitted to use my machine under the following conditions: My employment is in an engineering works, Government controlled, solely employed upon strictly war work, and the works is situated about twelve miles away from my home. During the war the trains have been curtailed to such an extent that there are only two trains outwards, one ten minutes after the other, and two trains homewards in the evening, and no trains whatever in between in either direction, and my only way home in that case is by going into the City, probably walking a mile or more for an electric car, on which I have thirty-five or forty minutes' journey, and, incidentally, losing from one and a half to two and a half or even more hours by the process. Under the very best conditions the journey occupies two hours, while on the motor I can be home in thirty-five minutes.

The Petrol Committee replied they could give no opinion as to the reading of the Act.

I then applied to the City Head Constable, and he replied that as my journey lay through roads for the most part not under his supervision he would recommend me to apply to the County Constabulary.

This I did, and the reply was that if I had an up-to-date petrol licence I was at liberty to use my machine as indicated in the Act, and that it appeared I might be justified in using the machine as I proposed.

All this is about as clear as good, thick mud. What on earth has an up-to-date petrol licence got to do with it? I have the juice, obtained in a perfectly legitimate and above-board manner. Used as I propose to use it, it would last me six months. I do not want any more petrol—I have two gallons for starting purposes—and I do not propose to ask for any. I am proposing to use spirit obtained for pleasure purposes on business, but I have no intention of putting in an appearance before any magistrate if I can help it.

So where am I?

At present my motoring is confined to periodical visits to the shed to keep rust away, to oil up, and rub with vaseline, and give the handle an occasional turn—the machine is a 6 h.p. Enfield, and a jolly good machine, too—and then back into the house plus a lot of grease and dirt and a feeling that I have done a bit of motoring in spite of the Petrol Restriction Act, for I think the average motor cyclist is as happy overhauling his machine in the shed almost as he is watching the needle occasionally creep up to fifty on the open road, when there is no "bobby" looking. X.Y.Z.

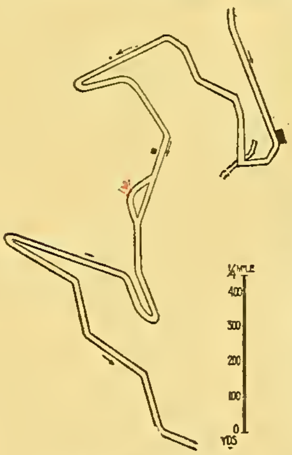
Liverpool.

[We think our correspondent will be quite justified in using his machine, but what individual magistrates will think is quite another matter. The case seems to hinge upon what may be considered as "reasonably convenient."—Ed.]

HAIRPIN BENDS.

Sir,—One hears a great deal of "hairpin bends" from riders in our road trials. I am sending you a plan of a road here in Palestine, which I have no doubt will be recognised by many lorry drivers and despatch riders who read the "Blue 'Un."

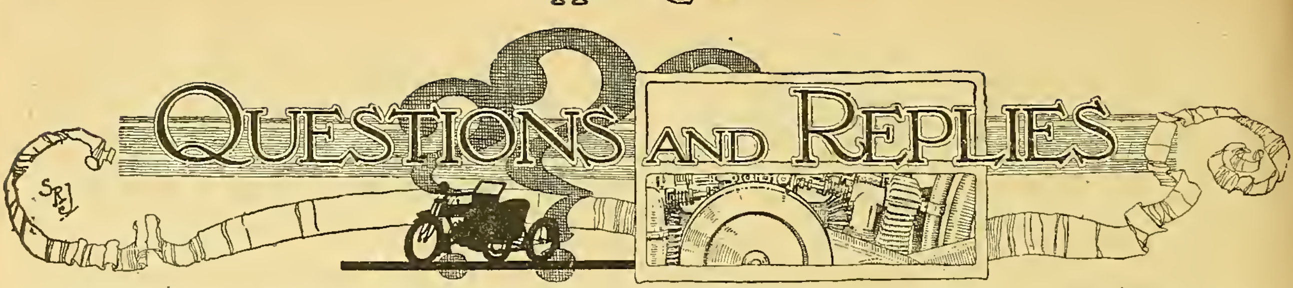
I wonder what some of the "old hands" would think if they had to tackle roads like this, consisting, as it does, of such bends, with a surface of metal about 4in. in diameter (unrolled) on a great part of it; also, nearly a sheer drop of several hundred feet if one gets over the edge (and there is no retaining wall if one should make a slip). Fortunately, accidents are rare, being prevented by having a "control" at the top and bottom, and traffic only allowed up or down at one time. If it would be of interest, I should be glad if you will kindly forward the plan to your sister journal, *The Autocar*.



Plan of a Palestine road.

I have the "Blue 'Un" sent me every week, and I feel sure that, in spite of the petty cavilling of one or two of your readers *re* your refusal to advertise German-made goods after the war, the good old *Motor Cycle* will still remain the dictionary of the motor cycling public.

Palestine. E. J. DAVIES (S.M., R.E.).



QUESTIONS AND REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Dynamo Wiring.

I have a dynamo fitted with three terminals. (1.) Why are there three terminals on some big and small dynamos? (2.) Is one of them the shunt winding; if so, why is its connection not internal? (3.) How is it to be wired up?—E.B.

There are so many different types of dynamos that there may be practically any number of terminals, and the fitting of a terminal externally or internally is due simply to manufacturing considerations. We should advise you to write to the manufacturers of your dynamo, who will give you the information you require.

The Use of Petrol.

Would you be kind enough to tell me if permission could be got to drive a motor cycle from Saltburn to Stockton, on the grounds of a change of residence? As I have no licence, where should I apply?—J.W.P.

In the Motor Spirit (Consolidation) and Gas Restriction Order, 1918, under the heading "Necessary household affairs" for which petrol may be used, it is specifically stated that a motor vehicle may be driven in connection with "house removal." If you have petrol, therefore, no petrol permit is necessary, but if you have no petrol application should be made to the Petrol Controller's Department, 19, Berkeley Street, London, W.1.

Licences.

(1.) I have bought a second-hand motor cycle. Will you please tell me where to apply for a driver's licence and a registration number? (2.) Please tell me the conditions under which I can get petrol for testing purposes, and where to apply for the permit.—R.D.

(1.) For a driving licence you apply to the Clerk of your local County Council. If the machine has been previously registered, you may have the registration transferred to your name for 1s. by applying to the clerk of the county or borough council with which it was registered, or, if this registration has been cancelled, you may re-register it with any county or borough council in the United Kingdom. (2.) We do not think petrol will be granted to you for the purpose of testing the machine, but if you care to try you may apply to the Petrol Controller. In your application you should make quite clear why you need the petrol, and you will also have to produce your local taxation licence receipt.

Misfiring.

Would you be good enough to suggest a possible cure for misfiring in my 7-9 h.p. Indian motor cycle? The misfiring only occurs on opening up the throttle from a very small throttle opening; otherwise the engine pulls magnificently at speeds of thirty miles and over. I have tested the spark, and have found it to be satisfactory. I have also taken the carburetter down, and there appears to be nothing the matter with it. I have also cleaned the carbon brushes on the magneto, and can find no air leaks in the inlet domes or at the induction pipe unions. Closing the extra air shutter makes no difference to the misfiring.—P.J.C.

Owing to the bad petrol we are getting at the present time it would be advisable to open up the slots in the jet, and this will probably cure the misfiring of which you complain.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

Petrol for Naval Men on Leave.

Would you kindly let me know through the "Blue 'Un" whether Naval officers are allowed the small quantity of petrol which is allowed to Army officers whilst on leave? If I am allowed a little joy-ride, would you kindly let me know how and where to obtain permission to secure petrol for the purpose?—Ramsgate.

Naval officers are treated practically the same as military officers as regards petrol for use on leave, so long as this leave is not simply a few hours ashore. In order to save time, you should call personally at the Petrol Controller's office, 19, Berkeley Street, London, W.1. Your query breaks every rule under which we undertake to answer questions, and, but for the exceptional circumstances, we should be compelled to ignore it completely. Also the answer has been previously given in *The Motor Cycle.*

An Old Friend Again.

I use my sidecar for business purposes, which I explained when I made my application for petrol. Can I take my wife in the sidecar to see friends some forty miles from here?—A.J.

If your journey to visit friends would be undertaken solely for that purpose you cannot undertake it without incurring the risk of a fine. The presence or absence of a passenger in the sidecar would make no difference to the case.

Running on Paraffin.

(1.) What alterations would be necessary to the carburetter and engine of a 5 h.p. twin Indian to enable me to run on paraffin? (2.) What is the cause of "cutting out" when opening the throttle when running on the pilot jet? The engine stops for three or four yards. If I soldered up one or two of the holes in the main jet, would it be likely to prevent this from occurring?—E.J.Q.

(1.) The Indian carburetter is not suitable for use with paraffin. You can only make the engine run on paraffin by fitting a vaporiser to heat the fuel. The air should also be taken in warm, and the fuel should be heated by coiling the fuel pipe round one of the cylinder heads. In any case we do not think you will obtain very good results from the use of paraffin alone. (2.) The fact that the engine ceased to fire for a few yards may be due to many causes. When the throttle is opened suddenly there is a quick demand on the jet for more petrol, and any obstruction in the petrol supply pipe would cause the trouble. Again, the extra air lever may be too far open. If you soldered up any of the holes in the main jet it would probably make the matter worse. Do not interfere with the jet, but try the next size larger after verifying that all is clear.

RECOMMENDED ROUTES.

Oxford to Market Harborough.—V.R.

Oxford, Weston, Middleton Stoney, Brackley, Towcester, Northampton, Brixworth, Market Harborough.

Plymouth to the Mendip Hills.—L.C.F.

Plymouth, Ivybridge, Ashburton, Exeter, Cullompton, Wellington, Taunton, Durston, Othery, Glastonbury, Wells, where you will find yourself at the foot of the Mendip Hills. Approximately 106 miles.

C.A.V. Magnetos

BRITISH THROUGHOUT

THE SUPREME TEST of War finds the C.A.V. All-British Magneto unequalled for reliability. The testimony of our Despatch Riders may be translated in the one word—SPLENDID.

C. A. VANDERVELL & Co., LTD.
Electrical Engineers
ACTON, LONDON, W.3
Members of the British Ignition Apparatus Assn.

Economical Insurance for Motor Cyclists

PROVIDENT ACCIDENT AND GUARANTEE COMPANY, LIMITED,

FORMERLY KNOWN AS
THE PROVIDENT CLERKS' AND GENERAL GUARANTEE AND ACCIDENT CO., LTD.
ESTABLISHED 1865.

REASONABLE POLICY CONDITIONS. PROMPT SETTLEMENT OF CLAIMS.

£10 REWARD.

£10 will be paid for information which may lead to the recovery of a "Royal Enfield" 6 h.p. Combination. Registration No. MX 6681, Engine No. W 5071. Special screen and hood, Watford speedometer No. 70S, 1915 make. Also the same amount will be paid for similar information leading to the recovery of a 1914/15 3½ h.p. Twin "Zenith," Engine No. 52830, mag. chain case slightly damaged "Matchless" 8B Model, Engine No. 34572, Frame No. 3041, Regd. No. LR 3766 undertank tube cracked at head.

H.P.	PREMIUMS FOR PRIVATE USE ONLY. VALUE OF MOTOR CYCLE and SIDECAR. Not Exceeding £50.	Exceeding £50.
Under 3½	£2 7 6	£2 10 0
3½	2 10 0	2 15 0
4½	2 15 0	3 0 0
5—6	3 0 0	3 10 0
7—9	3 17 6	4 7 6

15% REDUCTION IF INSURED BEARS THE FIRST £1 OF ALL CLAIMS.
25% " " " " £2 " "

Extra benefits and Personal Accident Insurance included at slightly increased premiums.

FULL PARTICULARS ON APPLICATION TO—
Head Office: 61, COLEMAN STREET, LONDON, E.C.
West End Office: 199, PICCADILLY, LONDON, W.
Telegrams—"Perpend, Ave, London." Telephone—London Wall, 5306 (4 lines).

"You Naughty Dog

Look what you've done to my brand new Mac, and I couldn't mend it if I didn't know of

Mend-a-Tear"

PATENT

And amongst the readers of *The Motor Cycle* there must be thousands of jags like that—jags which only that wonderful new material which "mends without stitches" can effectively repair. Are you one of these readers? and do you know it? If not, remember it is sold in two styles—KHAKI AND GENERAL—

at 1/- per Carton.

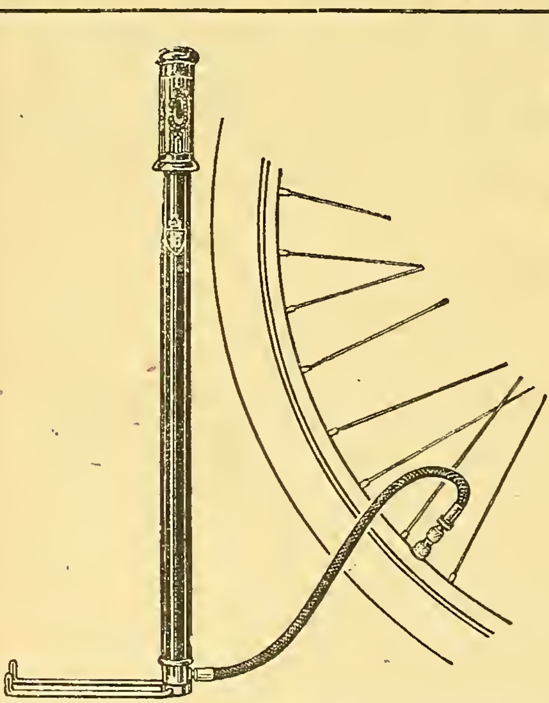
and that you can procure a sample free in return for a 1½d. stamped addressed envelope.

LEICESTER RUBBER CO., LTD., 10, Granby Mills, **LEICESTER,**

Makers of the renowned John Bull Cycle and Motor Cycle Tyres

There's never a tear you can't repair with Mend-a-Tear.

Bluemels



"Motobike" Pump

fulfils its particular function faithfully and well, so, when buying, look for the famous Bluemel Trade Mark—a B and feather. It is a guarantee of quality and faithful service.

NOWEIGHT

BLUEMEL BROS., LIMITED,
WOLSTON, - - Nr. COVENTRY.

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns -First 12 words or less 1/6, and 3d. for every vo words after. Each paragraph is charged parately. Name and address must be counted. eries discounts, conditions, and special terms regular trade advertisers will be quoted on pplication.

Postal Orders sent in payment for advertisements should be made payable to LIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be ccompanied with remittance, and be addressed the offices of "The Motor Cycle," Hertford treet, Coventry. To ensure insertion letters hould be posted in time to reach the offices of The Motor Cycle," Coventry, or London (20, udor St., E.C.4), by the first post on Friday norning previous to the day of issue.

All letters relating to advertisements should uote the number which is printed at the end of ach advertisement, and the date of the issue n which it appeared.

The proprietors are not responsible for clerical r printers' errors, although every care is taken o avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

A.J.S.

1915 A.J.S. Solo, 4h.p.; a bargain, £55.—Ross, 86, High Rd., Lee. [5972

CROW Bros., Guildford, A.J.S. agents since 1912, always have dependable second-hand machines. [5369

A.J.S. 1916 4h.p. Twin, 3 speeds, sloping frame, kick start, all accessories, guaranteed; £67.—Maudes', below.

A.J.S., 1915, 2¾h.p., 2 speeds, sloping frame, kick start and clutch, fully guaranteed; £46.—Maudes', 100, Gt. Portland St., London, W.1. [6108

A.J.S. 1918 6h.p. Combination, Lucas dynamo and lamps, spring seat, spare wheel, very smart; £97/10.—Farrar.

A.J.S. 1915 6h.p. Combination, spare wheel, Lucas lamps, Cowey speedometer, extra smart; £87/10.—Farrar.

A.J.S. 6h.p. Combinations.—We have five in stock. If you wish to buy, sell, or exchange your A.J.S., write us.—Farrar's Motors, Hopwood Lane, Halifax. [6124

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—1915 A.J.S., 2¾h.p., 2-speed, clutch, kick start; 39 gns. [5798

A.J.S. 6h.p. 1916 Combination, large sidecar, special make, Lucas lamps, 2 horns, glass screen and cover, spare wheel, etc.; 90 gns.—T.H., 57, York Rd., Southport. [5968

FORWARD FACTS.
No. 2.

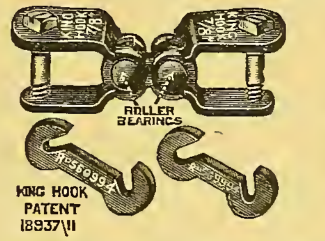
Once the fastener is "gone" your ride is over, unless, of course, a spare forms part of your equipment.

The risk of such a failure is practically NIL when you fit the

FORWARD—

That's why both the Forward and the King Hook are everywhere so popular!

Let us send you fuller details.



The Model here illustrated is the KING HOOK, which is retailed at 1/-; adjustable, 1/3 each.

FORWARD MOTOR CO.,
Forward Works, Summer Row.
BIRMINGHAM.

GRADO MULTI-PULLEYS
TURN WORK INTO PLEASURE.
STARTS LIKE A CAR.
SOLVES STARTING, TRAFFIC, AND HILL TROUBLE.

Order to-day. Delivery from Stock.

GRADO, LIMITED,
PERSHORE STREET,
BIRMINGHAM.

MAGNETO
REPAIRS
and spare parts

We are well qualified to undertake the repair of Magnetos of all makes, and to supply spare parts, being, as we are, one of the most experienced firms manufacturing Magnetos

SIMMS MOTOR UNITS, Ltd.,
Percy Buildings, Gresse Street, London, W.1.

MOTOR CYCLES FOR SALE.

A.J.S.

MOTOR Cycle, 6h.p. 1915 A.J.S., with sidecar, in perfect order, tyres new; £60 cash.—Box L6,398, c/o *The Motor Cycle.* [5926

1914 A.J.S. 6h.p. Countershaft Combination, lamps, speedometer, wind screen; £50, offer; exchange.—24, Beauval Rd., East Dulwich. [6081

A.J.S.—Immediate delivery of Military Model, 700×80 tyres, detachable wheels; £91/6.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

DELIVERY from stock of Military Model A.J.S., 700×80 tyres, detachable wheels; £91/6.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0551

A.J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; £91/6; no permits required.—P. J. Evans, sole agent for Birmingham and district, 87-91, John Bright St., Birmingham. [5675

LATE 1916 A.J.S., 4h.p. solo, and extras, £76; spare wheel and tyre, £6; a portable garage takes combination easily, almost new, £7, nearest offer; 22 gallon barrel Gamage oil at 3/6 gallon.—2, Sneath Av., Golder's Green, London. [X5426

A.J.S. Spares; prompt delivery. — Cyril Williams, Chapel Ash Depot, Wolverhampton. [4997

Alldays.

ALLON, 2¾h.p., 2-speed, 2-stroke, new August, 1917, little used; 37 gns.—27, All Saints' Rd., Ipswich. [X5457

ALLON, brand new 2-stroke, shop-soiled only; list price £39/12, reduced to £32.—Maudes', 100, Gt. Portland St., London, W.1. [6109

ALLON Motor Cycle, 1918, 2-speed, hand operating clutch model, new; price £51.—Medland, Iona, Taunton Rd., Bridgwater. [X5394

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Allon, 1916, 2-speed, 2-stroke, perfect, 29 gns.; Allon, 1917, 2-speed, 2-stroke, ridden 800 miles, 35 gns. [5799

Ariel.

1914 2-speed Ariel Combination; bargain, £40.—Ross, 86, High Rd., Lee. [5973

CROW Bros., Guildford, Ariel agents.—New and overhauled second-hand models in stock. [5370

A.S.L.

A.S.L., 3½h.p. J.A.P., Grado gear, Bosch mag.; £14/10.—Motor Exchange, Horton St., Halifax. [6016

Auto-Wheels.

AUTO MOTOR, 3½h.p., Bosch mag., good tyres; £7/10.—Motor Exchange, 68, Horton St., Halifax. [6015

Bat.

10h.p. Bat Road Racer, J.A.P. engine, overhead valves; £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [6084

BAT 6h.p. Twin, 2-speed countershaft gear, J.A.P. engine, round tank, solo machine, but would take sidecar; price £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [6093

Bradbury.

BRADBURY 6h.p. Twin, new sidecar, excellent condition; bargain, £60.—Troup, 47, Green Rd., Reading. [X5404

BRADBURY, 4h.p., 1914, Bosch, Palmer cord tyres, splendid condition; £28, bargain.—62, Magpie Hall Rd., Chatham. [5950

BRADBURY, 1914, 6h.p., and sidecar, £55; 1912-1913 3½h.p., 3 speeds, with coach sidecar, £32/10; 1913 3½h.p., 3-speed model, £29/10.—Motor Exchange, Horton St., Halifax. [6017

4h.p. Bradbury, 3-speed Sturmey-Archer, clutch, kick starter, Dunlop tyres and belt, P. and H. lamps and generator, Cowey speedometer, Phœnix coach sidecar, 4 gallons petrol.—22, Vale Rd., Finsbury Park, N. [6070

B.S.A.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—B.S.A., 1913, 3½h.p., 2-speed, clutch, pedal starter; 25 gns. [5801

B.S.A., late 1915, belt and chain drive, 3 speeds, 4¼ h.p., good condition; £46, or offer; owner called up.—7, Baillie Rd., Guildford. [5954

1916 B.S.A. and Millford sidecar, 4¼h.p., chain-cum-belt, lamps, horn; bargain, £55.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0552

3½h.p. B.S.A., with C.B. sidecar, 2 speeds, new tyres, in good order; nearest £45; part exchange for roll top desk, typewriter.—Hardman, Cinnamon St., Rochdale. [X5376

1916 Model B.S.A. and coachbuilt sidecar, 4¼h.p., 3-speed, kick starter, all accessories, very little used, good as new, guaranteed; £65.—Salter, 59, West St., Boston. [6059

1917 B.S.A. 4¼h.p. Big Single, 3-speed countershaft gear, free engine, and kick starter, includes accessories, £57/10; also a 1916 model, same specifications, £45; guaranteed.—Wauchope's, 9, Shoe Lane, London. [6091

MOTOR CYCLES FOR SALE.

B.S.A.

B.S.A. Motor Cycle, practically new, 3-speed, 1916 model, fitted with sidecar, shock absorbers, speedometer, Powell and Hanmer head lights, Dunlop extra heavy tyres; £85, no offers.—Caversham Motors, Ltd., Reading. [5763

LATE 1914 4¼h.p. B.S.A. Sidecar Combination, chain drive, variable gear, Stewart speedometer, wind screen, long horn, owner-driven, carefully used, had little wear, new condition; price £55.—Willoughby, Decorator, Wolverhampton. [X5430

1915 B.S.A. 4¼h.p. Combination, in perfect condition, hood, wind screen, 3-speed, kick starter, all-chain drive, lamps, horn, etc., has been recently thoroughly overhauled; £42/10; reason for selling, owner joining army.—Apply, Alfred Sachs, 96, Goldhawk Rd., Shepherd's Bush, London. [X5354

Calthorpe.

1916 Calthorpe 2-stroke, lamps and horn; £30.—Parker and Son, St. Ives, Hunts. [5990

CALTHORPE Lightweight, 2¾h.p. engine, 2-speed, equal to new; £28.—Bates, Gun Maker, Canterbury. [6053

CALTHORPE Lightweight, 2½h.p. J.A.P., 2-speed gear; £24.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3523

CALTHORPE Junior, 2h.p. Precision, 2-speed, engine perfect condition; reasonable offer accepted.—Grimshaw, 50, Whalley Banks, Blackburn. [X5398

CALTHORPE Motor Cycles.—All models in stock for immediate delivery; trade supplied; no permits required.—P. J. Evans, 91, John Bright St., Birmingham. [5677

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Calthorpe-Jap, 1915, 2¾h.p., 2-speed, clutch, renovated, 24 gns.; another, 22 gns.; Calthorpe, 1915, 2-speed, 2-stroke, 23 gns. [5802

CALTHORPE, 1917 (new March), Calthorpe-Jap, 2-speed model, speedometer, condition as new, only run just over 1,400 miles; £30, no offers.—Edwards, 89, Wigmore St., W.1. Mayfair 283. [5955

2¼h.p. Calthorpe, 2-stroke 2-speed model, but little used, includes accessories, £22/10; also two new models, one single speed with J.A.P. engine £32, another 2-speed J.A.P. engine £39/18.—Wauchope's, 9, Shoe Lane, London. [6088

Campion.

CAMPION-J.A.P., 1915 6h.p. twin, 3-speed, kick starter, and coach sidecar, all as new; £65 cash.—Swallow, Dudley Rd., Grantham. [X5422

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Campion, 1916, 2-stroke, 2-speed, 24 gns.; Campion-Jap, 1915, 3½h.p., Jardine 2-speed gear box, all chain drive, new condition, 36 gns. [5803

Chater-Lea.

1915 7-9h.p. Chater Combination, perfect order; £54.—86, High Rd., Lee. [5983

Clyno.

1912 6h.p. Clyno, 2-speed, new tyres, powerful; £24.—86, High Rd., Lee. [5987

CLYNO 5h.p. Twin, sidecar, beautiful turnout; £45; 3-speed.—Bates, Gun Maker, Canterbury. [6051

2½h.p. Clyno, 2-stroke model, reliable, speedy; £22/10; guaranteed.—Wauchope's, 9, Shoe Lane, London. [6096

LATE 1911 Clyno Combination, 2-speed, clutch, sound condition; £18, or offer.—3, Otto St., Kennington Park. [6132

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Clyno, 1916, 2-speed, 2-stroke, hand clutch, re-enamelled and replated; 27 gns. [5805

CLYNO 1914-15 6h.p. Combination, new condition, detachable wheels, spares, hood, storm sides, speedometer, Klaxon, fully equipped; £45, no offers; real bargain; must sell.—11, Pretoria Av., Walthamstow. [5995

Connaught.

1914 2¾h.p. 2-speed Connaught, good order; £20.—86, High Rd., Lee. [5974

Coventry Eagle.

RIDER TROWARD and Co., 31 end 40b, High St., Hampstead.—Coventry Eagle, 1916, 2-speed, 2-stroke, re-enamelled and replated; 29 gns. [5804

Diamond.

DIAMOND, 2¾h.p., 2-speed, 2-stroke, extra good; £25/10.—Motor Exchange, Horton St., Halifax. [6018

Douglas.

DOUGLAS, 1912, 2-speed, complete; £20.—Shand, 14, Brandram Rd., Lee, S.E.13. [5953

DOUGLAS.—Prompt delivery to those on work of national importance.—Gibb, Gloucester. [4749

DOUGLAS, 1913-14, in fine condition; best offer over £20.—34, Ashvale Rd., Tooting, S.W. [6065

TWO 3½h.p. Douglas 2-speed models, fully equipped; £45 each.—Wauchope's, 9, Shoe Lane, London. [6085

DOUGLAS, 2¾h.p., 1911, 2-speed; £38; excellent condition.—Bates, 3, St. George's Gate, Canterbury. [6052

DOUGLAS; prompt delivery to farmers, doctors, and others doing work of National importance.—Moffat, Yeovil. Tel.: 50 [5855

CASH—War loan or other securities taken.

CREDIT—Delivery at once, or when paid for.

EXCHANGE—Any reasonable proposition considered.

REMEMBER—This is the reliable house, and all machines sold by us are guaranteed in good running order. Trial allowed, satisfaction assured. Full details of any machine sent on application.

NOTE—Most machines in the list are complete with accessories, and in many cases speedometers, and other fittings.

LIGHTWEIGHTS (Two-stroke).

ALLDAYS ALLON, new, 2¾ h.p.	£38	14
ALLDAYS ALLON, new, 2¾ h.p., 2-speed, hand clutch	£48 /7 /6	
ALLDAYS ALLON, 2¾ h.p., 1917, as new	£38	0
CLYNO, 1914	£19	0
COVENTRY EAGLE, new, 2½ h.p., 2-speed countershaft	£44	2
CONNAUGHT MINIATURE, new, 2½ h.p., 2-speed	£41 /6 /6	
CONNAUGHT, Standard, new, 2½ h.p., 2-sp.	£44	10
J.H., new, 2½ h.p., 2-speed countershaft	£35	14
METRO, Lady's, 2-speed countershaft	£36	10
NEW HUDSON, 2-speed, 2½ h.p.	£25	0
SUN-V.T.S., new, 2½ h.p.	£30	10

LIGHTWEIGHTS (Four-stroke).

A.J.S., 1913-14, 2¾ h.p., 2-sp. c/shaft, clutch	£35	0
A.J.S., 1914, 3-speed, clutch, and kick-starter	£42	10
DOUGLAS, 2¾ h.p.	£16	0
DOUGLAS, lady's	£28	0
F.N., 2¼ h.p., 2-speed, clutch	£12	0
NEW IMPERIAL, new, 2-sp., clutch, k.-start.	£54 /5 /6	
NEW IMPERIAL, 1916, 2¾ h.p., 2-speed	£30	8
O.K.-JUNIOR, Mark IV., new, 2½ h.p., 2-sp., clutch	£43	0
O.K.-JUNIOR, 1914, 2½ h.p., 2-speed	£25	0

MEDIUM WEIGHTS.

ABINGDON, 1914, 3½ h.p.	£23	15
B.S.A., 1914, 4¼ h.p.	£31	0
B.S.A., 1913, clutch model, 3½ h.p.	£25	0
BRADBURY, 3½ h.p.	£11	10
BROWN, 3½ h.p.	£14	5
BROUGH, 1916, 3-speed	£64	0
JAMES, 4¼ h.p., 3-sp., electric, Canoelet S.C.	£75	0
NEW HUDSON, 1913, 3½ h.p., 3-speed	£29	10
PREMIER, 1914, 3-speed	£28	10
PREMIER, 1916, 3½ h.p., 3-speed countershaft, clutch, kick-starter, C.B. Sidecar	£62	0
PREMIER, 3½ h.p., 2-speed, clutch	£19	10
PREMIER, 1914, 3-sp., c/shaft, clutch, k.-st.	£42	10
PEUGEOT, 4 h.p., V-twin	£12	0
ROVER, 1913, 3½ h.p., 3-speed	£32	10
RUDGE, 1913, 3½ h.p., Multi F.E.	£25	0
RUDGE, 1913, 3½ h.p., 2-sp., c/shaft, clutch, sporting Sidecar	£34	4
RUDGE, 1912, 3½ h.p., N.S.U. gear	£21	0
SUNBEAM, 3½ h.p., new, complete Comb.	—	
SUNBEAM, 1915, 3½ h.p., and Sidecar	£65	0
SWIFT, 1914, 3½ h.p., 3-speed, and clutch	£35	0
TRIUMPH, 1913, 3½ h.p.	£28	10
TRIUMPH, 3½ h.p., and wicker Sidecar	£19	0
TRIUMPH, 1913, 3½ h.p., 3-sp., hub clutch, and coachbuilt Sidecar	£38	10

HEAVYWEIGHT COMBINATIONS.

A.J.S., 6 h.p., new (Sidecar extra)	£92	6
ENFIELD, 1916, 6 h.p., 2-speed	£85	0
ENFIELD, 1915, 6 h.p., 2-speed countershaft	£69	10
HARLEY-DAVIDSON, 1915, 7-9 h.p., 3 sp. countershaft	£65	0
HAZLEWOOD, 1914, 5-6 h.p., 3-sp. countershaft, and kick-starter	£68	17
INDIAN, 1915, 7-9 h.p., 3-speed, kick-starter, and Millford Sidecar	£60	0
MATCHLESS, new, 8 h.p., War Model	£125	0
RUDGE MULTI, 5-6 h.p.	£39	10

LIGHT CARS.

ENFIELD (new)	£242	0
ENFIELD	£185	0
HORSTMANN	£150	0
BABY PEUGEOT	£165	0
ADAMSON	£120	0
HURLINCAR	£150	0
G.W.K., 1914	£125	0
G.W.K., 1912	£97	10
HUMBERETTE	£65	0

The Service Company Ltd.
(LONDON)

293, High Holborn, London, W.C.1.

Tele: Admittedly, London. 'Phone, 6430, Holborn.

MOTOR CYCLES FOR SALE.

Douglas.

1914 Douglas, 3½h.p., 2-speed, and sidecar, lamps horn; £50.—Elce and Co., 15-16, Bishopsgat Av., Camomile St., E.C.3. [049

DOUGLAS Motor Cycles.—We can supply by retur 1918 models on receipt of permit.—Eli Clark the Douglas agent, 196, Cheltenham Rd., Bristol. [092

DOUGLAS, late 1913, T.T., 2-speed model, Bosc mag., fully equipped, very fast; must sell, owne joining up; trial any time; bargain, £25.—Smith, 12a Broad St., Reading. [594

DOUGLAS 1915 4h.p. Combination, 3 speeds, kic start, all accessories, £60; 1914 2¾h.p., speed ometer, lamps, and horn, £35.—Maudes', 100, Gt. Port land St., London, W.1. [610

1912-13 Douglas, 2¾h.p., 2-speed countershaft gear Bosch mag., new tyres, lamp, horn, and stand running order; first cash £14/10 secures, bargain; stamp reply.—46, Grove Rd., Norwich. [X543

1913 2¾h.p. Douglas, 2-speed and clutch, lamps generator, and mechanical horn, tyres and bel almost new, unused last 2½ years; bargain, £24/10.—Whale, 56, Townshend Rd., N.W.8. [613

DOUGLAS.—New 1918 models supplied to farmers, doctors, etc., against Ministry of Munitions permit. 1913 2-speed Douglas, £29/10; 1914 2-speed model, £34/10.—Motor Exchange, Horton St., Halifax [601

1917 4h.p. Models A. and B. Douglas, 2¾h.p. Model W., also U. and V. models, 1916 specification absolutely new; immediate delivery against Priority Permit for doctors, farmers, war and munition workers.—How and where to apply, full particulars, write Dougla Specialists, Robinson's Garage, Green St., Cambridge. [611

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Douglas, 1915, 2¾h.p., 2-speed, re-enamelled and replated, 42 gns.; Douglas, 1916, 4h.p., Colonial Model, 3-speed, T.T., fine condition, 59 gns.; Douglas, 1913, 2¾h.p., 2-speed, clutch, kick start, 29 gns.; Douglas, 1913, T.T., 2-speed, 27 gns.; Douglas, 1911, 2-speed, 29 gns.; Douglas, 1911, single speed, 14 gns. [5806

Enfield.

6h.p. Enfield Combination, like new.—27, High St., Doncaster. [6129

1914 2-speed Twin Enfield, 3h.p.; £25.—Ross, 86, High Rd., Lee. [597

ENFIELD 2¾h.p. Twin, 1913, chain drive, Enfield 2-speed gear; £18/10.—Eagles and Co., High St., Acton. [X5432

ENFIELD 1914 3h.p. Twin Lightweight Combination, excellent condition; £25.—175, Stockwell Rd., Brixton. [607

ENFIELD 3h.p. Twin, 66 gns.; touring and T.T. models in stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3522

2-SPEED 2-stroke Enfield, delivered March 30th, not ridden 100 miles; £40.—Mrs. Clarke, Sparhawk, Bury St. Edmunds. [X5459

1916 Enfield Combination, 8h.p., lamps, horn, screen, speedometer, in new condition; £70.—26, Bridgewater St., Runcorn. [X5356

1915 Enfield, 3h.p., 2-speed, lamps, horn, good condition; £32.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0491

ENFIELD, 1915, 6h.p., 2-speed coach combination, in fine order, £72/10; 1916 model, £82/10.—Motor Exchange, Horton St., Halifax. [602

ENFIELD 1915 3h.p. Twin, 2-speed, free engine, kic starter; £38; in good order, new tyres.—G. F Richings, Grove St., Wantage, Berks. [601.

6h.p. 1914 Royal Enfield Combination, fully equipped £55; also new Enfield 2-stroke, 2-speed, from stock —Wauchope's, 9, Shoe Lane, London. [608

RIDER TROWARD and Co., 31 and 40b, High St. Hampstead.—Enfield, 1916 Colonial Model combination, 69 gns.; Enfield 1916 standard model combination, 66 gns.; Enfield, 1916, 3h.p., 2-speed, as new, 42 gns.; ditto, 1915, 32 gns. [5807

1916 Royal Enfield 3h.p. Twin, 2-speed, kick starter, 2 lamps, horn, speedometer, and spares, splendid condition; 39 gns., War Bonds taken.—Gray, Farnborough, near Banbury, Oxon. [6014

1916 Enfield 6h.p. Combination, elaborately equipped, hood, wind screen, electric lighting, speedometer, mechanical horn, watch, and other accessories, beautiful condition; 100 gns.—4, Ellerby St., Fulham, S.W.6. [6043

6h.p. 1915 Royal Enfield Combination, Lucas dynamo lighting, engine just thoroughly overhauled by makers, will climb any hill, Horn's speedometer, tyres good as new, perfect condition; 80 gns.—George Widdop, Ripponden, near Halifax. [X5357

Excelsior.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—British Excelsior, 2-speed, 2-stroke, 1916; 25 gns. [5800

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—1917 American Excelsior combination, as new; 85 gns. [5842

EXCELSIOR, 1912-13 clutch model, Bosch, Druids, splendid order throughout; bargain, £15/10; appointment.—25, Strafford Rd., Acton. [6122

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

F.N.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—F.N., 1913, 5-6h.p., 2-speed; 29 gns. [5808

F.N., 2½h.p., fitted with latest Douglas 2-speed gear box, C.A.V. H.T. mag., etc.; bargain, £12.—60, tormont Rd., Lavender Hill, London, S.W. [6082

Harley-Davidson.

1915 7-9h.p. Harley Combination, perfect order; bargain, £52.—86, High Rd., Lee. [5976

HARLEY-DAVIDSON Combination, 1915 model, in splendid order; £65.—34, Ashvale Rd., Tooting, S.W. [6066

HARLEY-DAVIDSON, 1916, with Harley sidecar and accessories; £82/10.—Motor Exchange, Horton St., Halifax. [6022

HARLEY-DAVIDSON, nearly new, solo machine, engine No. 1,475 M.; 70 gns.—S. Butcher, Benenden, Kent. [5958

HARLEY-DAVIDSON Combination, 1917, 7-9h.p., lamps, horn, splendid condition; special bargain, £105.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0481

HARLEY-DAVIDSON 1917 7h.p. Combination, electrically equipped, Millford 2-seater sidecar, speedometer, all accessories, only done 500 miles, as new; £115.—Maudes', below.

HARLEY-DAVIDSON, 1917, 7h.p., electric model, Millford sidecar, standard specification; £110.—Maudes', 100, Gt. Portland St., London, W.1. [6100

1915 Harley-Davidson Combination, in excellent mechanical condition, 3-speed, kick starter, Bosch mag., mechanical horn, lamps, generator, etc.; this machine climbed Pebblecombe Hill (Dorking) in a competition at 73 m.p.h., mileage under 3,000, unused for 18 months; £65.—Whale, 56, Townshend Rd., N.W.8. [6134

Henderson.

HENDERSON, 1915, 4-cyl., 2 speeds, handle starting, genuine Henderson sidecar, electric lamps and horn, indistinguishable from new; great bargain, £85.—Maudes', 100, Gt. Portland St., London, W.1. [6106

Humber.

3½h.p. 3-speed Humber and sidecar; £20.—86, High Rd., Lee. [5986

HUMBER 3½h.p. Combination, 2 speeds, perfect; £25.—171, Brunswick Rd., Poplar. [6055

HUMBER, 3½h.p., vertical engine, mag., spring forks; £13/10.—Motor Exchange, Horton St., Halifax. [6021

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Immediate delivery new 3½h.p. flat twin Humber, 3-speed; £75; no permit required. [5809

Indian.

1915 5h.p. Red Indian, T.T model, 3-speed, clutch; 38 gns.—Railway Garage, Staines. [5771

INDIAN, 1915, 7-9h.p., clutch model, T.T. roadster, very fast; bargain, £26.—Maudes', 100, Gt. Portland St., London, W.1. [6105

7-9h.p. 1914 Indian, 2-speed gear model, mechanically sound, fully equipped; 30 gns.; guaranteed.—Wauchope's, 9, Shoe Lane, London. [6083

1914 7-9h.p. Indian Spring Frame Combination, 2-speed, in sound condition, less silencer; for quick sale £35.—Palferman, High St., Bangor. [X5438

INDIAN, 7-9h.p., free engine, twin, £23/10; 1914 7-9h.p., 2 speeds, spring frame, Millford sidecar, £49/10.—Motor Exchange, Horton St., Halifax. [6023

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Indian, 1916, T.T., 7-9h.p., clutch, disc wheels, as new, 48 gns.; ditto, 1915, re-enamelled and replated, 42 gns.; ditto, 1915, standard, 37 gns.; Indian, 1915, 5h.p., 3-speed, 39 gns.; Indian, 1914, 7-9 h.p., T.T., clutch, 29 gns.; Indian, 1914, 7-9h.p., 2-speed, spring frame, 36 gns.; Indian, 1914 7-9h.p. coachbuilt combination, 48 gns.; also many Indian parts and several sidecars.—'Phone: Hampstead 5392. [5810

Ivy.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Ivy-Precision, 1915, 4¼h.p., 3-speed, solo; 31 gns. [5811

Ixion.

1914 2½h.p. Ixion, 2-stroke, good order; £13.—86, High Rd., Lee. [5977

James.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—James, 1914, 4¼h.p., 3-speed, big single; 35 gns. [5813

J.A.P.

1914 5-6h.p. J.A.P. Combination, lamps and horn, 3-speed, kick starter, good condition; £38.—Parker and Son, St. Ives, Hunts. [5992

COMPULSORY Sale.—J.A.P. Sociable, 5-6h.p., excellent condition, latest improvements, perfect running condition; £50, or take reliable lightweight or lady's and gent's cycles part exchange; no rubbish offered or wanted; offers.—Newton, 142, London Rd., Preston. [X5406

J.H.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—J.H., 1916-17, 8h.p. M.A.G., Mills-Fulford sidecar, hood, screen, Sturmey countershaft gears; 85 gns. [5812

GET IT AT

Taylor's

Triumph Mechanical Horn, motor cycle size....each	27/6
Marvel Steam Vulcaniser, motor cycle size....each	13/9
Smith Speedometer, Trip Model	£5 5 0
New Dual Chassis (underslung), with 650 × 65 rim, for 6 h.p. machine ..	£8 2 6
A.J.S. 1916 Coachbuilt Sidecar Body, black finish	£6 6 0

MACHINES.

1918 6 h.p. **A.J.S.** Combination, complete with storm apron, screen, lamps, and horn; nearly new	£115 0 0
1916 2¾ h.p. **A.J.S.,** 3-speed, beautiful condition, lamps, horn, speedometer	£47 10 0
1916 6 h.p. **ENFIELD** Combination, storm apron, lamps, horn, speedometer	£76 0 0
1916 3 h.p. **ENFIELD,** fully equipped	£46 10 0

H. TAYLOR & CO., LTD.

Showrooms : 21a, STORE STREET, W.C.1.
Wholesale : 38, ALFRED PLACE, W.C.1.
Garage: Tottenham Mews. 'Phone—Museum, 1240.
Telegrams—"Dynametro, Westcent, London."

Enamelling OUTFIT No. 1.

For Motor Cycle and Sidecar.

INCLUDES an ample supply of absolutely everything you need to thoroughly renovate a Motor Cycle and Sidecar. Contents: Sponge, Chamois Leather, Rubbing Felt, Pumice Block, Robbialac Brush, Glass Paper, Cleaning Soda, Pumice Powder, Auto-Stopper, "Rusnoline" Polishing Liquid, Robbialac Thinners, Robbialac Stopping, Mat, Gloss, Transparent; and Instructions. Price **35/-**. Carriage extra England and Wales 1/6, Scotland and Ireland 2/-. Full particulars, including large Colour Card, from **Jenson & Nicholson, Ltd., M.C. Outfit Dept., Robbialac Works, Stratford, London, E.15.** Sole manufacturers of

ROBBIALAC

MOTOR CYCLES FOR SALE.

Kerry.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Kerry-Abingdon, 1914, 4h.p., T.T., good order; 24 gns. [5814

Lincoln-Elk.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Lincoln-Elk, 1913, 3½h.p., variable gear; 19 gns. [5815

LINCOLN-ELK, 1914, 6h.p., countershaft gear, underslung coach sidecar; £45.—Motor Exchange, Horton St., Halifax. [6024

Levis.

2½h.p. T.T. Levis, looks like new; will accept £28.—80, Sycamore Rd., Handsworth. [5965

LEVIS 2½h.p. 1916 Model E., all chain drive, Enfield 2-speed gear; £30.—Eagles and Co., High St., Acton. [X5431

LEVIS, latest type, 2 speeds, 2-stroke model; immediate delivery for work of National importance; £47/10.—Maudes', 100, Gt. Portland St., London, W.1. [6110

LEVIS, 2¼h.p., new last August, run 1,800 miles, acetylene and electric sets, accessories, 130 p.g., very easy starter, exceptional climber; £27, cost £38.—Davison, Chemist, Nuneaton. [X5419

Matchless.

1914 4h.p. Twin Matchless, C.B. combination, like new; £45.—86, High Rd., Lee. [5984

1914-15 Matchless Combination, 8h.p. M.A.G., lamps, horn, good condition; £65.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0480

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Early delivery of the new Matchless combination; £125, complete; no permit required. [5843

MATCHLESS.—Delivery from actual stock of M.A.G. and J.A.P. engined models; exchanges if desired. —Maudes', 100, Gt. Portland St., London, W.1. [5576

MATCHLESS Combination, 8h.p., new Nov., 1917, not done 500 miles; seen Newcastle-on-Tyne district, perfect order; owner eligible; £100, no offers.—Box 2,030, c/o *The Motor Cycle.* [X5462

1915 Matchless Combination, M.A.G. engine, fully equipped, including Lucas electric lighting dynamo set, speedometer, excellent condition; £75, spot cash; no offers.—Millar, 49a, George St., Croydon. [X5458

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Matchless 1915 8h.p. J.A.P. coachbuilt combination, 3-speed, 59 gns.; Matchless 1913 6h.p. J.A.P. coachbuilt combination, 2-speed, 35 gns. [5817

M.M.C.

OFFERS wanted.—3½h.p. M.M.C. motor cycle, engine rebushed, Bosch, B. and B., Mabon variable gear, good tyres.—38, Vassall Rd., Brixton, London, S.W.9. [6060

Motosacoche.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Motosacoche, 1916, 3½h.p. twin M.A.G. engine, Enfield gears, clutch, and kick start, De Lissa air-cooled exhaust valves, as new throughout, 42 gns.; ditto, 1914 model, good order, 29 gns. [5816

New Hudson.

NEW Hudson, 3½h.p., 3-speed, and new coach sidecar; £32/10.—Motor Exchange, Horton St., Halifax. [6026

NEW Hudson, 4h.p., Druids, tank, stands, carrier, mudguards, and handle-bars, U.S. 2-speed wheel, sidecar chassis, good order.—38, Arsenal Rd., S.E.9. [5997

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—New Hudson 1915 big six 3-speed coachbuilt combination, 52 gns.; New Hudson 1914 big six 3-speed coachbuilt combination, 45 gns.; New Hudson, 1916, 2-speed, 2-stroke, renovated throughout, 29 gns. [5818

New Imperial.

1915 2¾h.p. Imperial-Jap, 2-speed, powerful; £23.—86, High Rd., Lee. [5978

CROW Bros., Guildford.—New Imperial, all models, new and second-hand, in stock. [5371

NEW Imperial, 2¾h.p. J.A.P., 1916, 2 speeds, new condition; £28/10.—Eagles and Co., High St., Acton, W. [X5435

NEW Imperial-Jap, 8h.p., 3-speed War Model combination; 109 gns.; delivery from stock.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3521

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—New Imperial, 1916, 2-speed J.A.P., as new, 29 gns.; ditto, 1915, 24 gns.; both the above machines have been re-enamelled and replated throughout. [5821

NEW Imperial Motor Cycles, 2 speeds, clutch and kick starter, and lady's models in stock for immediate delivery; trade supplied; no permits required. —P. J. Evans, 91, John Bright St., Birmingham. [5678

1916 (latest model) 2¾h.p. New Imperial-Jap, kick start, free engine, clutch, and 2 speeds, perfect, ridden very little; also lightweight Raleigh sidecar combination, with spares, etc.; £40, or sell apart; owner in France.—Wood and Goldstraw, Town Hall, Tunstall. [X5418

Noble.

NOBLE, 2½h.p., chain drive Bosch mag., B. and B. carburetter, good tyres and appearance; can be seen running here, 80 m.p.g.; £15, no offers.—Fry, Postmaster, Peppard Common, Oxon. [X5351

All letters relating to advertisements should quote the number at the end of each advertisement, and the date of the issue.

MOTOR CYCLES FOR SALE.

Norton.

NORTON Big Four, all chain drive; £82/10; in stock. —Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3524

3½h.p. 1915 T.T. Norton, powerful engine; lowest price 40 gns.—Wauchope's, 9, Shoe Lane, London. [6089

NORTON Big 4, 1918, all-chain drive military model, countershaft 3-speed, kick start, as new; £69.—127, Vauxhall Rd., Liverpool. [X5423

BIG Four Norton, 1916, equipped with lamps, horn, splendid condition throughout; £65.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0597

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Immediate delivery of the new 1918 Military Model Norton, 4h.p., Sturmey countershaft gears, chain drive; £82/10. [5819

NORTON 3½h.p. T.T., almost as new, fully equipped, speedometer, etc., special machine, fast, perfect; any trial; best offer secures, or take good typewriter, National cash register, piano, or good clean stock; cash adjustment.—Albert, 1, Church St., Kingston, S.W. [6079

N.S.U.

N.S.U., 3h.p., 2-speed, fine condition, £11/10; 3½h.p., 2-speed, new coach sidecar, £22/10.—Motor Exchange, Horton St., Halifax. [6025

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—N.S.U. 1913 3h.p. twin, 2-speed, clutch, attractive lightweight; 19 gns. [5820

T.T. N.S.U., 2-speed, F.E., enamelled red, very fast, complete with spares; must sell; no reasonable offer refused.—Boasley, 16, Hume Rd., Notting Hill. [5993

HAVING Acquired the entire stock-in-trade of the N.S.U. Motor Co., Ltd., we can supply spares for practically all types of N.S.U. motor cycles. In ordering it is important to submit old parts as patterns.—Eagles and Co., Acton Hill Works, Acton, W.3. [0739

N.U.T.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—N.U.T.-J.A.P., 1915, 3½h.p. twin, o.h.v., T.T., very fast; 35 gns [5822

O.K.

1914 2¼h.p. O.K., 2-speed, nice order; £15.—Ross, 86, High Rd., Lee. [5979

O.K. Juniors are real joy-ride mounts.—For early delivery order now from Youngs, The Parade, Kilburn, N.W.6. [0944

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—O.K.-J.A.P., 1916, 2½h.p., 2-speed, hand clutch, 26 gns.; O.K.-Precision, 1914, 3½h.p., T.T., good order, 19 gns. [5823

P. and M.

P. and M. and Sidecar, 2-speed, good order; £14.—35, Clerkenwell Close, E.C. [6133

1914 P. and M., 3½h.p., O.B. sidecar, all accessories; £40.—86, High Rd., Lee. [5988

Peugeot.

5h.p. Twin Peugeot Combination, 2-speed; £22/10; perfect; sidecar complete, 25/-.—Quarry Cottage, Hilltop, Bromsgrove. [X5397

Precision.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Precision, 1914, 4h.p., T.T., good order; 19 gns. [5825

3¾h.p. Precision Unit, B. and B., Bosch watertight mag., variable pulley, perfect condition; £16.—T., 52, Nags Head Rd., Ponders End. [6013

1914 2½h.p., Precision engine, 4-stroke, single gear, Bosch, Amac, good tyres, fine condition; 16 gns.—F. Sargent, 321, Cemetery Rd., Cannock. [X5407

P.V.

P.V. 6h.p. Combination, spring frame, Bosch, N.S.U. 2-speed, free, mechanically perfect, needs slight repair; 30 gns., bargain.—Cleaver, 11, Station Parade, Muswell Hill, N.10. [6006

Premier.

PREMIER, 3½h.p., 1912-13, 3 speeds; 17 gns.—W. Moxham, 11, Strathleven Rd., S.W.2. [6047

PREMIER Motor Cycle, Armstrong 3-speed gear, wicker sidecar; £20.—St. Edmund Motor Co., Northampton. [X5402

PREMIER, 3½h.p., Sturmey-Archer 3-speed and clutch, heavy Dunlops, engine recently overhauled, Mills-Fulford coachbuilt sidecar; bargain, £25.—Walker, Cumnor, Oxford. [X5424

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Premier, 1913, 3½h.p., 2-speed, clutch, 24 gns.; Premier, 1915, 2½h.p., clutch model lightweight, 23 gns.; Premier, 1913, 3½h.p., 3-speed combination, 29 gns.; Premier, 1914, 3½h.p., 2-speed countershaft 29 gns.; Premier, 1914, 3½h.p., 3-speed coachbuilt combination, 35 gns.; Premier, 1915, 3½h.p., 3-speed, Canoelet sidecar, 45 gns. [5824

Quadrant.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Quadrant, 1913, 3½h.p., 3-speed; 24 gns. [5826

Radco.

RADCO, 1915, 2-speed, 2-stroke; £22/10.—Motor Exchange, Horton St., Halifax. [6027

LAMB'S

200 PEDAL CYCLES IN STOCK AT LOWEST PRICES.

NEW MACHINES.

Calthorpe Co.'s gent's roadster, 2 or 3-sp., Dunlop tyres, gear cases, 22, 24, or 26in.
Calthorpe Co.'s lady's, 2 or 3-sp. gear, Dunlop tyres, 20, 22, or 24in.
Ariel, lady's Standard, 20, 22, 24in.
Ariel, gent's Standard, 22, 24, 26in.
New Hudson, gent's Royal Roadster, 21, 23, 25in.
New Hudson, lady's Standard.
New Hudson, gent's Standard.
New Hudson, lady's Royal.
Raleigh, Model E.
Juvenile Cycles, boy's and girl's, ex Raleigh.
Conqueror, 24in. gent's.
Conqueror, 22in., R.R.
Ariel, R.R., 24in. and 26in.
Sparkbrook, grand lightweight, chocolate finish, 26in.
Raleigh Tradesman.

Brown Bros.' Roadster, gent's, 26in.	**£12 12**

---

1 gent's Tricycle, 24in. frame	**12 gns.**
1 gent's Tricycle, 24in frame, with box	**9 gns.**

SECOND-HAND MACHINES.

1 **New Hudson** model, 24in., R.R.	**£6 10**
Ariel, gent's, 22in., R.R.	**£5 15**
1 Lady-back Tandem, Chater-Lea fittings	**£10 10**
2 22in. gent's R.R.	**£4 10**
1 **Raleigh,** 3-speed, 29in. frame	**£9 9**
1 **Rudge** Crescent Racer, 26in. frame, fixed gear	**£7 15**
Royal Enfield girder, gent's, 24in., 3-speed	**£10 0**
New Hudson, 24in., roadster, 3-speed	**£7 10**
B.S.A. Racer, 23in.	**£9 9**
Triumph, 2-speed, 24in., roadster	**£6 15**
Referee Racer, 23in.	**£6 15**
Racer, 24in.	**£4 4**
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RIDER TROWARD and Co., 31 and 40b, High S Hampstead.—Radco, 1915, 2½h.p., 2-stroke; 17 g [58

Rex.

RIDER TROWARD and Co., 31 and 40b, High S Hampstead.—Rex, 1915, 8h.p., T.T., clutch, han start, 29 gns.; Rex 1914 8h.p. 2-speed combinati 27 gns. [58

REX 3½h.p. Tourist, £12/10; 2¾h.p., 3-spe £22/10; 2-speed twin, £18/10; Rex 6h.p. tw m.o.v., £14/10; 1914 2-speed, 6h.p., and coach side £46/10.—Motor Exchange, Horton St., Halifax. [60

Roach.

ROACH, 3½h.p., Kerry 2 speeds, free engine, a sidecar; £18/10.—Motor Exchange, Horton S Halifax. [60

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1914 3½h.p. Rover, 3-speed, very fast; £24.—86, Hi Rd., Lee. [59

1914 3½h.p. 3-speed Rover, lamps, horn; £38. Parker and Son, St. Ives, Hunts. [59

ROVER, 1914, 3½h.p., T.T. model, fine order; £29/1 —Motor Exchange, Horton St., Halifax. [60

ROVER 1915 3½h.p. Combination, Rover sidecar, speeds, all accessories, excellent condition; £52. Maudes', 100, Gt. Portland St., London, W.1. [61

OWING to Officer's death, new 3½h.p. T.T. Rove late 1917, used a month, perfect condition; £5 cost £64/12.—Apply, Stewart, Heath Farm, Petersfiel [595

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ROVER Motor Cycles, 3½h.p. and 5-6h.p. models, i stock for immediate delivery, both solo and sid car outfits; trade supplied; no permits required.— J. Evans, 91, John Bright St., Birmingham. [567

Rudge.

RUDGE Multi 3½h.p. Combination, good conditio fast; £25.—157, Brixton Hill, London. [607

1914 Rudge Multi, 5-6h.p., h.b.c. control, sound con dition; £26.—Steele, Silverdale, Staffs. [X540

RUDGE Multi, 5-6h.p., with coach sidecar, ver powerful; £45.—Motor Exchange, Horton St. Halifax. [603

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3½h.p. 1917 Rudge Multi, up-to-date machine, ne condition, includes all accessories; price 50 gns. guaranteed.—Wauchope's, 9, Shoe Lane, London. [609

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RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Rudge Multi, 1914, 3½h.p., re-enamelled and replated, 36 gns.; Rudge Multi, 1913, 3½h.p., standard, 28 gns.; Rudge, 1913, 3½h.p., variable gear, solo, 23 gns., with sporting sidecar 29 gns.; Rudge, 1915, 5-6h.p., 3-speed, clutch, kick start, 37 gns.; Rudge, 1913, 3½h.p., single speed, 21 gns. [5827

Scott.

SCOTT, 1915, 3¾h.p. model, 2 speeds, kick start, Palmer tyres, Binks carburetter, all lamps; £38.—Maudes', 100, Gt. Portland St., London, W.1. [6102

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Scott, 1914, 3h.p., 2-speed, clutch, kick start, Scott coach sidecar, 37 gns.; solo, 31 gns.; many Scott parts in stock. [5832

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RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Sheffield Minor, 1916, 2-stroke, sloping tank, as new; 19 gns. [5830

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RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Singer, 1914, T.T., 2½h.p., clutch, 19 gns.; Singer, 1913, 3½h.p., clutch, 22 gns. [5831

Sun.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Sun-Villiers, 1916, 2½h.p., 2-speed, 24 gns.; ditto, single speed, 18 gns. [5833

Sunbeam.

1916 Sunbeam Combination, 8h.p. M.A.G., lamps, horn, splendid condition; £100.—Below.

1915 Sunbeam Combination, 6h.p., Lucas dynamo lighting and horn, hood, screen, spare wheel, horn, mirror, watch, speedometer, mud shields, splendid condition; £105.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0479

3½h.p. Sunbeam Combination, 1914 model, nice sound turnout, includes Lucas best accessories, tools, storm apron; £75; guaranteed.—Wauchope's, 9, Shoe Lane, London. [6090

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Motor Cycles and the Luxury Tax.

WE are not yet aware of what the Government intend in the matter of imposing a luxury tax upon motor cycles. If they follow the French model slavishly, motor cycles above a certain value will be classed as luxuries. At the present time it can be asserted without much fear of contradiction that no motor cycle is a luxury. Such machines as are still on the road—and they are indeed few—are necessities pure and simple, run by their owners either in the national service or for strictly business purposes. They would not be allowed on the road at all, except under these conditions.

As, however, we assume that the luxury tax will remain in force for some little time after the war, and possibly after the resumption of recreative motoring, it may not be inappropriate to consider the position of the motor cycle with regard to this tax. Already the motor cycle is the most highly taxed vehicle on the road having due regard to its size and weight. If a rider has a new machine every year his taxes are as follow: Local taxation, £1; driving licence, 5s.; registration, 5s.; to this may be added petrol tax at 1s. per gallon, making a total of, say, £3 per annum. The owner of a horse and trap pays only one-quarter of this amount, occupies much more of the road, and does considerably more damage. It may be urged that a motor bicycle, with its greater speed, travels a greater distance in the course of a year than a horse and trap. This may have been the case before the war, but with the present petrol allowance (usually half a gallon a week) it is quite possible that it is not true at the present time, and, owing to the greater speed of the motor cycle, it is probable that, even if the horse and trap does not travel quite so far, it is longer on the road.

We hope that the French model to which we have referred will not be followed too closely, for it contains many absurdities, *e.g.*, feathers are untaxed up to the value of 20s.; school books are taxed no matter what the value. Any schoolboy can say which is the greater luxury.

A Petrol Control Department Anomaly.

AS is generally well known, the Petrol Controller's Department grant short-time licences to soldiers and sailors on leave from Overseas. These licences are granted to all owners of motor cycles, or to those who can borrow machines from members of their families.

Recently a case came to our notice of a soldier to whom leave was due applying to the Petrol Controller's Department for petrol to run his father's motor bicycle during his leave. In accordance with the regulations, he sent up the registered number, and on the case being investigated by the Department it was found that the father had already a petrol licence. Now, it was the inflexible rule of the Petrol Controller's Department not to grant two licences in one family, consequently the soldier's application was refused, although it was pointed out to the Department that the case seemed to be a very hard one. It seems an injustice and a typical instance of Government red tape that this soldier, who was looking forward to the use of a machine during his leave, should be prevented from enjoying a little well-earned recreation simply because there happens to be already a petrol licence in his family.

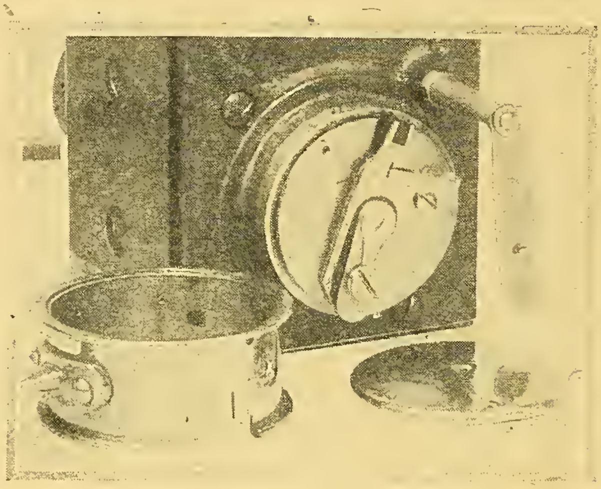
It is perfectly obvious that the licence is granted to his father for strictly business purposes, and it is clear that the two gallons a month which he receives is only sufficient for the particular purpose for which it is allotted, and that there will be none left for the soldier son when he comes home. The matter of a few gallons of petrol is of so little importance and yet can involve so much hardship that we should think that the Petrol Department might well reconsider the matter.

An index to the advertisements in this issue will be found on the page facing the back cover

A HIGH-SPEED CONTACT BREAKER.

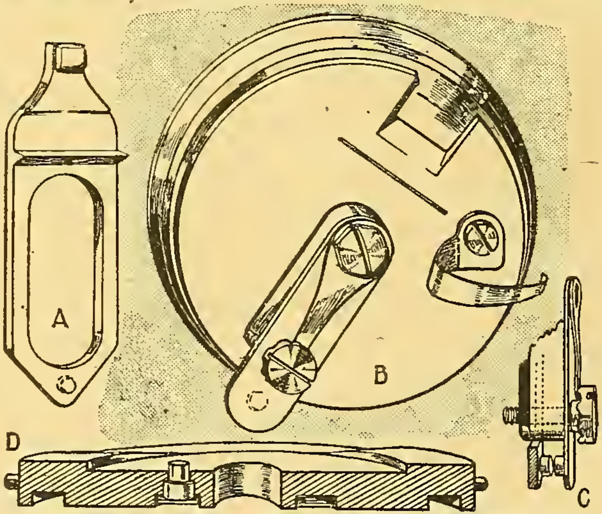
A CLEVER DESIGN OF REMARKABLE SIMPLICITY.

THE development of the magneto contact breaker has progressed considerably in the direction of high speed make and break, and one hears rumours of wonderful magnetos which will give an astonishing number of sparks per minute, but many makers under Government control find development somewhat hindered by the slavish adherence to Bosch designs in Government specifications.



The Payne contact breaker with cover removed.

Mr. Alex F. Payne, of 149, Metchley Lane, Harborne, Birmingham, is an inventor who has departed from the customary pattern, and has produced a contact breaker which is simplicity itself. It has a minimum of moving parts in which friction is almost absent, and its sparking capacity is only limited by electrical considerations in the magneto itself. A light rocker arm, carrying the fibre wipe on one end and one platinum point at the other, lies across a face plate, and a knife edge resting in a groove gives the fulcrum for the necessary movement. The face cam on the fixed plate behind the contact breaker opens the points, and a light spring operating on the rocker arm close to the fulcrum closes them. The total movement is almost imperceptible.



A. The rocker arm, carrying platinum point and fibre block. Note the knife-edged fulcrum.
B. Contact breaker, with rocker arm removed.
C. Adjustment of platinum points.
D. Section through cam plate showing fitting of carbon brush.

The inventor makes a particular point of the accessibility and ease of adjustment. We have the magneto before us, and have dismounted and reassembled the whole contact breaker in less than one minute, using only a penknife. The points can be adjusted by turning a screw head with a screwdriver or knife blade, and serrations on the underside in conjunction with a light spring prevent any slipping out of adjustment. The rocker arm can be detached and replaced with the fingers so easily that its removal might be recommended as a good method of preventing theft when the motor cycle is left unattended. The rocker arm balance is so carefully arranged that a very light spring is all that is needed, and the weight of the arm is so distributed that centrifugal force helps to close the points.

Such a simple design should be capable of make and break at almost any speed. The limit of test so far is 6,000 revs. per minute—a very high speed for a single-cylinder magneto. It has stood the test well—in fact, it is almost certain that the only limit to its sparking capacity is when the high speed distorts the lines of magnetic force to such an extent that the primary circuit is not broken.

It speaks well for its wearing qualities that the model before us has completed over seven million revs. on test at high speed without any appreciable sign of wear. This type of make and break has the particular advantage that it runs equally well in either direction.

There are several other new ideas incorporated in this model, notably the fitting of the carbon brush in the front of the cam plate instead of in the usual place at the back of the contact breaker.

Mr. Payne has fully protected his ideas, and the patents embody numerous alternative methods, including application to an internal cam of the usual Bosch type. Several well-known firms have given it favourable consideration, and have tested it to their own satisfaction, but the departure from the accepted Bosch type seems to be the chief stumbling block in the way of its development on a larger scale at present. We must congratulate the inventor on the excellent workmanship of his experimental models. He will be glad to supply models for test to any firms who may be interested.

The Petrol Control Department has issued a new Order which permits licensed motor cabs, *i.e.*, taxicabs, to be driven outside the areas hitherto sanctioned for their employment, provided that the class of journey comes within certain categories. The concession applies to journeys undertaken on any urgent necessity where life or limb is, or may be, endangered; for the conveyance of a sick or injured person to a place where he may receive treatment, or to or from a nursing home; or for visiting a person who is dangerously ill.

Occasional Comments by "Ixion"

Huns Use V Engines?

I ASKED the other week for some information about the type of bicycle used by the Hun D.R.'s. Advices to hand are extremely scanty, but indicate that both for despatch riding and light machine gun units Fritz relies on a very heavy machine with a V twin-cylinder engine. It is probable that two makes are used, of which one is the N.S.U. When sufficient time has elapsed for my enquiry to reach the Palestine Front, we may get further details.

Difficult Starting.

I READ with considerable interest the Rev. W. F. A. Ellison's wrinkles for kick-starting a B.S.A. His methods obviously suit the B.S.A., or he would not be so enthusiastic about them: but they do not necessarily suit other machines, and therefore they are not given as standard practice in the "books," which he denounces for the omission. Considering the "cold start" first, he injects petrol, puts the piston just over the T.D.C. of the compression stroke, and then gives a mighty kick. This dodge suits the B.S.A., because it is an awkward engine to get spinning when it is cold, and because its carburetter will give a good puff of rich mixture. Many engines can be kicked round fast without this careful setting of the starter: and lots of carburetters are so adjusted that the jet does not readily furnish a good starting mixture, so that it is not wise with them to "exhaust the dope," as our correspondent does with his B.S.A. In other words, the meticulousness of his starter setting is a waste of time with some engines, and the consequent scavenging away of the petrol injection would actually destroy the hope of a start with certain carburetter adjustments.

Starting from Hot.

SIMILARLY, Mr. Ellison's hot starting methods are by no means of universal application. He suggests that, if the ignition and valves are in perfect order, faulty mixture must be responsible for any difficulty, and that riders often spoil the mixture by leaving the air lever shut, as they would for a cold start: that since the perfect mixtures for cold and hot engines are not identical, the air lever positions for cold and hot starts are not similar: the lever should be shut for a cold start, and a little way open for a hot start. This reasoning is plausible, and applies to some engines and carburetters: but it is not invariably sound.

For example, it is not true that the air lever should always be shut for a cold start: there are many machines on the road which like a fractional air opening. Again, when an engine is getting out of tune, the chief trouble about a hot start often consists not in a faulty mixture, but in the almost total absence of any mixture at all. The compression is very leaky, so that, when the engine is hot, hardly any suction is exerted on the jet with the piston moving at the speeds obtainable by operating the kick-starter; but when such an engine is cold, the compression leaks are partially sealed by gummy oil, and a better suck will be obtained. Under such circumstances, the air lever must be shut for a hot start, so that all available suction may be concentrated on the jet. Indeed, if the compression leaks existed solely at the piston rings, and not at the valves, it is conceivable that an engine might only start cold with the air lever open, and refuse to start when hot unless the air lever were shut—the exact opposite of Mr. Ellison's procedure.

Know your Machine.

THESE considerations explain why the starting methods recommended by Mr. Ellison and other "one machine" enthusiasts do not figure verbatim in *standardised* instruction books, written to cover all makes of engine and carburetter. One might say that starting methods vary according to at least five factors, viz.:

1. The make of the engine.
2. The tune of the engine.
3. The make of the carburetter.
4. The adjustment of the carburetter.
5. The leverage of the starting mechanism.

Even this formidable catalogue omits gear boxes of special design, which import additional complications; magnetos disfigured by a peculiarly weak slow-speed spark, etc., etc.

On the other hand, Mr. Ellison may well ask why *manufacturers'* handbooks fail to provide all the necessary information about proprietary machines. In this case, where one set of instructions could cover all imaginable situations, I suppose one of two explanations is true. Either the manufacturers deliberately simplify their instructions, in order to avoid confusing the minds of novices: or else the literary staff are not practical men in close touch with the running shed.

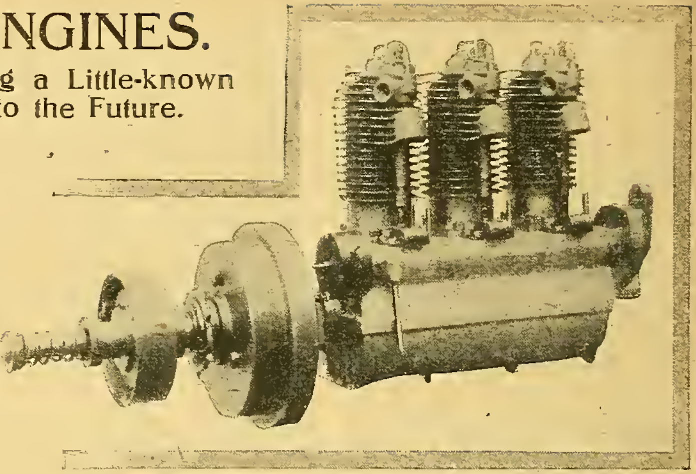
The makers should certainly supply an elementary handbook for novices, and this should be as simple as possible. It should be supplemented by more advanced booklets of hints and tips, such as those the Rudge and Triumph firms used to issue for advanced and studious owners.

Articulated Connecting Rods.

AS the Hun has long been aware, aero engines of the V type usually scorn the typical motor cycling method of linking up connecting rods. A popular pre-war design mounted the single rod so as to oscillate on the outside of a bush fixed in the ends of the forked rod. It has two chief defects. The area of the bearing was never excessive, and in repair work fitters had to be tolerably skilful if both the inside and outside of a single bush were to be true. In many V aero engines the single rod works on an auxiliary pin of its own fixed in housings provided on the outside of the main big end bush. Will this practice be imitated in post-war motor bicycle engines?

THREE-CYLINDER ENGINES.

Some Commentary Remarks concerning a Little-known Type of Engine, and a Peep into the Future.



A three-cylinder 8 h.p. J.A.P. engine, manufactured more than twelve years ago.

ALTHOUGH, on the point of balance, the single-cylinder engine, theoretically, is the worst type of all, it is perhaps the most popular. This goes to show that theory and practice do not always go hand in hand. It is, however, fairly safe to consider that the thing which is theoretically perfect will become recognised as superior in practice eventually.

In the car world the single-cylinder engine has disappeared entirely. Even in cheap, simple cycle cars a single-cylinder engine would hardly be accepted *at any price;* therefore one can say that the single-cylinder engine is being frozen out of the world of motor cycle mechanics. In the immediate future we shall have this type of engine for solo and medium-powered sidecar machines, but *the* sidecar machine will be one having more cylinders than one. At least, such is the opinion of the writer. Having reached this point, one considers which type of multi-cylinder engine will be most favoured in the future: the type which will emerge from the experiences gained with all types as the one embodying all their best points.

Will the V twin retain its popularity? I do not think so. If it does, it will be a very different type of V engine from that so popular at the present time. An ordinary V engine is really little more than a single with another cylinder added to the crank case. Each cylinder has not mechanism to do its work separately on the crankshaft. It can be likened, almost, to a river with two sources, the junction coming at the "big end" bearings.

Simplicity in Design.

It is, of course, a simple way to construct an engine, and simplicity is a virtue in motor cycle design, although designers who make a fetish of engine efficiency, and ignore the points which go to make up general or overall efficiency, may not always be satisfied to make simplicity the keynote of design, and eventually engine efficiency and general efficiency must make common cause and run in parallel lines. The perfect V undoubtedly will be the 90° type with a properly balanced crankshaft and outside flywheel. But supposing shaft transmission comes along as the "standard" transmission? There is no reason to suppose that it will not. Cars have passed through the same stages in development as the motor cycle may—belts, chains, and shafts. In engines, too, the car first had singles, then twins, then four and six-cylinder engines.

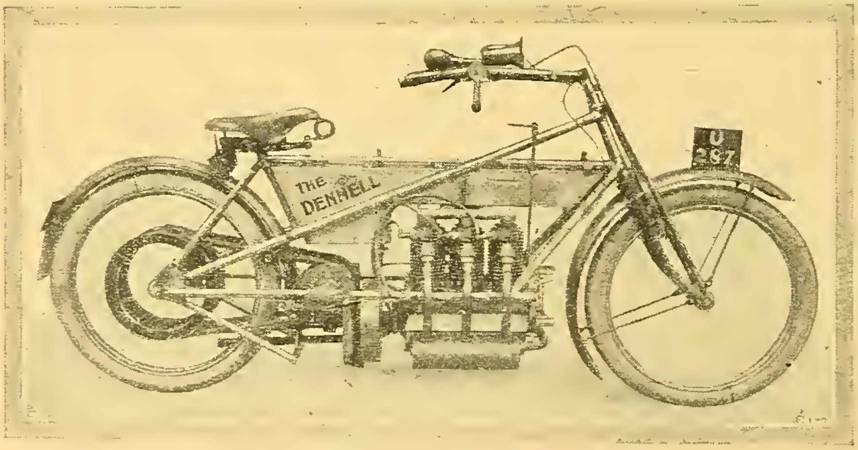
The Ideal Power Unit.

Arguing along these lines, one may say that the four-cylinder engine eventually will be the type for motor cycles, with perhaps a "six" as super de luxe models for munition millionaires. At present, however, one cannot expect a great deal of power from any cylinder much below 250 c.c., hence a four-cylinder machine will be about 1,000 c.c. total capacity, which, considering that engines of this size have proved to be sufficiently powerful for light cars, appears to be too large for the average sidecar machine. An engine with a total capacity of about 700 to 750 c.c. probably will be the "ideal" size for passenger work, but, when one considers cylinders of 200 c.c. or less, the "four" does not appear to be the type of the future.

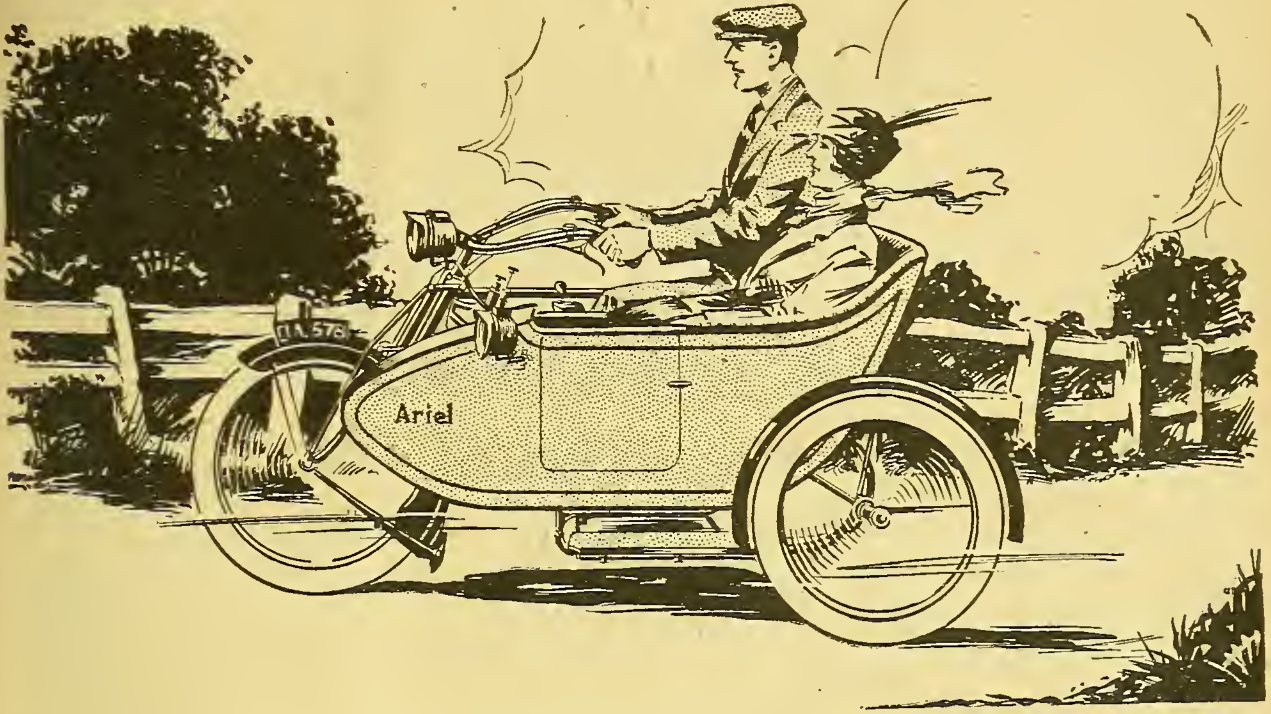
It has been proved that 250 c.c. per cylinder in a "four" is quite good. Then why not have three cylinders of this size?

Looking upon the V twin as a makeshift, the vertical twin out of it on account of its bad impulse torque, and the "four" because it is too large, a three-cylinder engine of the vertical type undoubtedly offers many advantages for careful consideration. The balance is good —in some respects superior to a "four"—and the firing is at equal intervals.

It may be remembered by some of the older readers of *The Motor Cycle* that a motor cycle with a three-cylinder engine was made in Leeds early in 1906. This was the



The Dennell motor cycle of 1906 fitted with a three-cylinder J.A.P. engine.



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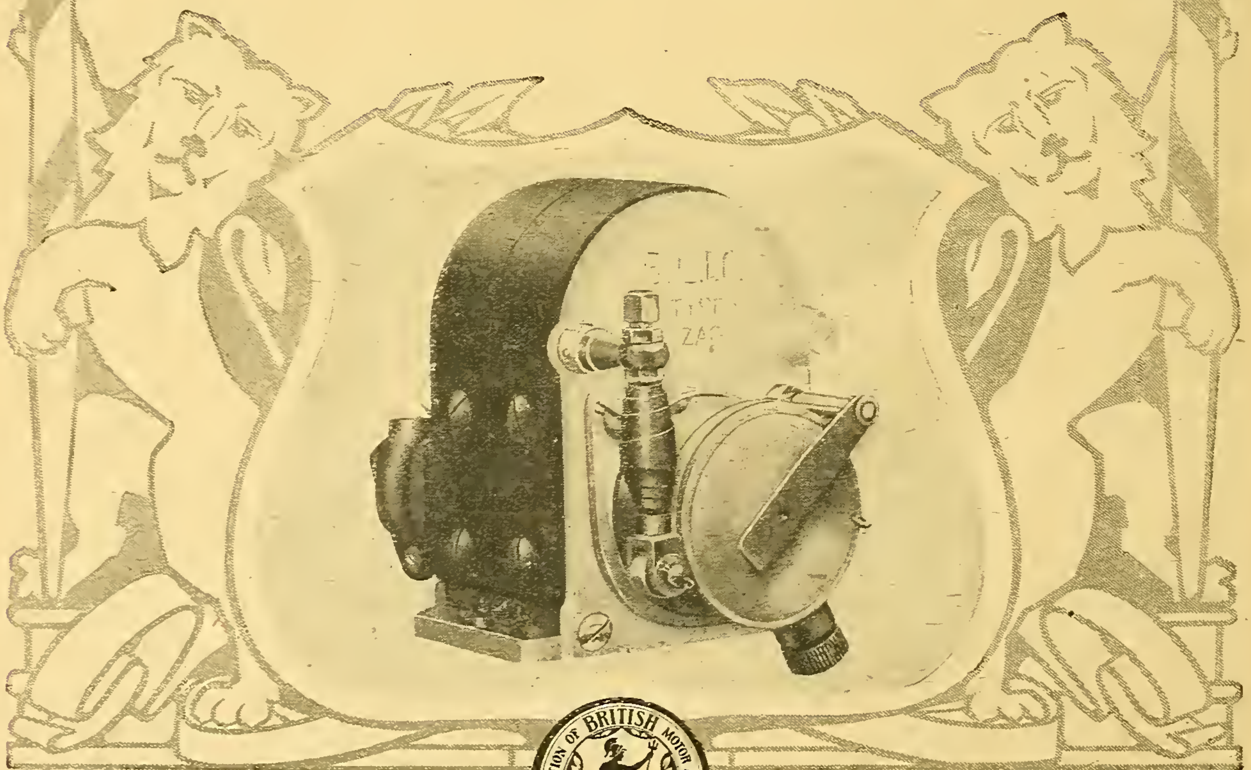


British Motor and Allied Manufacturers' Association

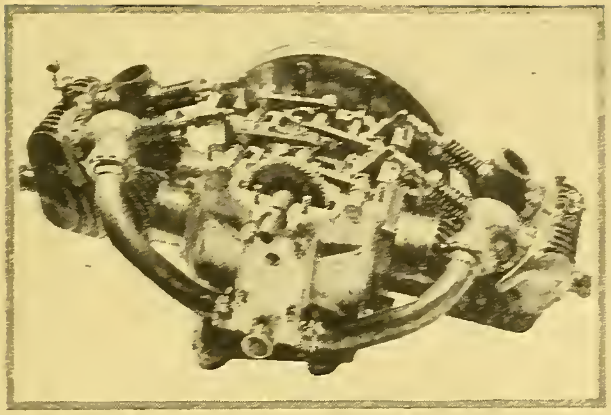
THE BRITISH LIGHTING AND IGNITION CO., Ltd.,

204, Tottenham Court Road,
London, W.1.
Proprietors - VICKERS, LIMITED.

In answering this advertisement it is desirable to mention "The Motor Cycle."

Three-cylinder Engines.—

Dennell, which is illustrated here. The Jowett light car concern also experimented with an engine of the kind, while Messrs. J. A. Prestwich marketed a vertical "three" for cars or cycles. In the car world, there were several cars fitted with three-cylinder vertical engines.



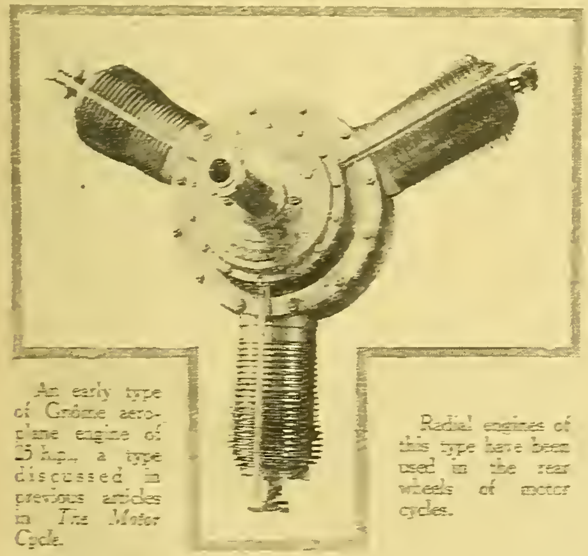
A paradox in steel—the Humber three-cylinder twin. Two small cylinders with common combustion heads oppose a single-cylinder of approximately twice the capacity.

There are other types of three-cylinder engine; in fact, about ten years ago there appeared promise of a three-cylinder boom in the French industry, while, it may be remembered, the Humber Company produced a three-cylinder opposed engine of a very unique design.

Most of these, however, may not again become popular, although one can never be sure. The great interest in aeronautical matters at the present time may lead to radial three-cylinder engines for both motor cycles and small cars.

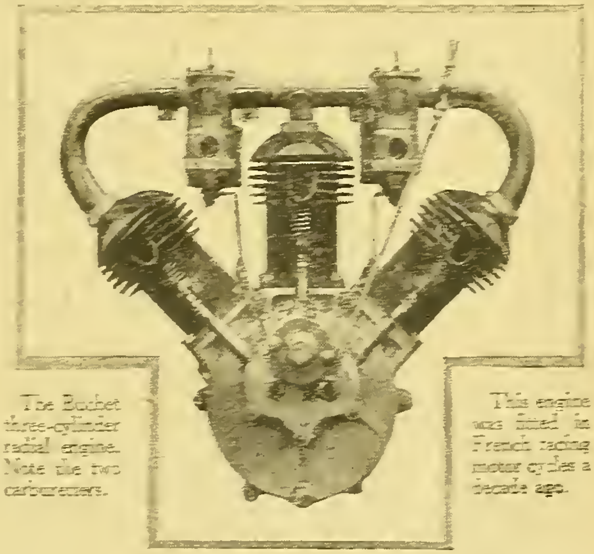
For a sidecar machine, however, I think in the three-cylinder vertical engine we have a type which is more than a compromise between the twin and the "four," and if shaft transmission finally takes the place of belts and chains, undoubtedly it will receive serious consideration on the part of designers who wish to produce lighter and more economical machines than the smallest practicable "four," and smoother running than is obtainable with any four-stroke twin which would be suitable for use with shaft transmission.

VELETTE.



An early type of Gnôme aeroplane engine of 25 h.p., a type discussed in previous articles in *The Motor Cycle*.

Radial engines of this type have been used in the rear wheels of motor cycles.



The Buchet three-cylinder radial engine. Note the two carburetters.

This engine was fitted in French racing motor cycles a decade ago.

The Automobile Association Coal Gas Prize.

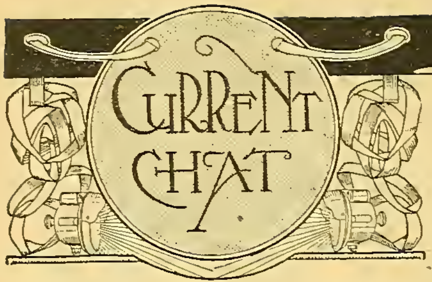
Progress of Entries for the £1,000 Prize.

MANY entries have been received for the A.A. competition, particulars of which we announced some time ago. Apparently the competition has not brought in only half-thought-out schemes, as it must be admitted many people expected it would, and many valuable suggestions have been received.

A most important incidental result of the competition has been the stimulation of research and investigation into the possibility of using other fuels besides coal gas, petrol, and petrol substitutes, while the important question of adequate supplies of coal gas and benzole for post-war requirements has received a much-needed impetus.

The competitors have come from all classes, including engineers, gas experts, private motorists, and mechanics, and it is significant of the new spirit animating the motoring community that experts on the fuel matters under consideration have expressed their willingness to investigate and bring the promising ideas of non-experts to a practical stage. Without expecting too much from the results, we hope real benefits will ensue.

Entries for the competition close on December 31st, 1918. Copies of the entry forms and the conditions governing the competition will be sent on application to the Secretary, A.A. and M.U., Fanum House, Whitcomb Street, London, W.C.2.



SPECIAL FEATURES

THREE-CYLINDER ENGINES. RICHTHOFEN'S DIARY.
A HIGH-SPEED CONTACT BREAKER.

TIME TO LIGHT LAMPS

SUMMER TIME.

June 27th	9.49 p.m.
,, 29th	9.49 ,,
July 1st	9.48 ,,
,, 3rd	9.48 ,,

Charity.

The handsome donation of £520 has been handed over to the Coventry and North Warwickshire Hospital as the result of the sports meetings, which were recently held under the auspices of Humber, Ltd., Coventry, on the Humber Recreation Ground.

Imports and Exports.

The value of imported motor cycle parts and accessories for May amounted to £586.

There is a decrease in the exports as against last month, and also against the corresponding month of 1917.

	1916	1917	1918
Motor cycles, parts, and accessories	79,866	60,850	48,861

The export figures for motor cars and parts are extraordinarily high for the month of May. The amount is £1,469,228, as against £210,658 for the corresponding month in 1917.

The Privileged Classes.

According to a correspondent, a Woolwich A.S.E. engineer, during the Whitsuntide holiday, rode 200 miles on his motor cycle without being questioned. Why are we all not engineers?

The Rand M.C.C.

At a committee meeting of the Rand M.C.C. some interesting resolutions were passed. It has been decided to discontinue all competitions and to concentrate on social runs in connection with the war funds or convalescent work. Further, the committee is going to bar "eligibles" from what may be called active club life.

Goods made in Germany.

Most of our readers will remember that a few months ago a lively discussion on our notice on this subject was carried on through our columns. A further step in the direction of the boycott of German goods has been recently proposed by the proprietor of an important Midland hotel. He asks everyone in control of hotels in Great Britain not to house any alien enemy, as such a step as this would make it extremely difficult for "these brutes to conduct their business as in pre-war times." The suggestion has the support of General Page Croft, M.P., who recommends all who agree with it to write to 22, King Street, London, S.W.1, for a National Boycott pledge.

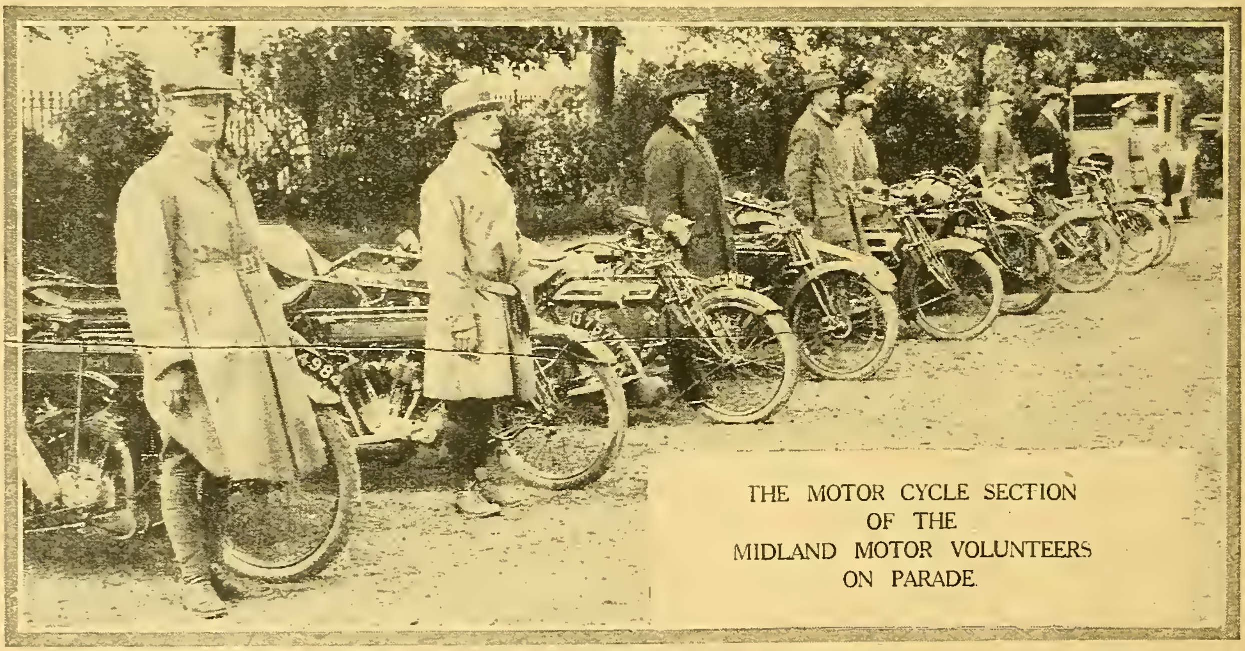
Larger Tyres or Spring Frames.

The increased comfort with oversize tyres is well worth the extra cost and weight. At one time a well-known competitions timekeeper used to ride a 2¾ h.p. Bat with a 3in. back tyre, and the comforts obtained with this softly inflated were most gratifying. With the roads in the condition in which they are likely to be immediately after the war, it may be anticipated that those firms who do not fit spring frames will consider the question of fitting larger tyres. Many have already decided to do so.

Tyre Repairs!

We take the following from the *Cape Times* of May 3rd, and refrain from comment:

"A Johannesburg motorist was hung up last Sunday on a lonely part of the road with a punctured back wheel, no repair outfit, and no spare tyre. The few cars that passed could afford no assistance, and the only shop within hail was the usual Greek fruiterer's. In an access of optimism (or desperation) the stranded motorist bought a shillingsworth of chewing gum—Chicelets, to be precise—and masticating three of the little tablets he pressed the result over the hole in the tube. This 'repair' took him all the way from Boksburg to Johannesburg, and the tyre was even standing up the next morning."



Motor cyclists on parade at the Midland Motor Volunteer Mobilisation Test last week. The machines shown in the photograph are the James, Enfield, Rover, A.J.S., and Rudge.

Police Trappers join up.

The latest draft of Metropolitan police to join up include two of the best known trappers in South London.

Alcohol.

What is being done to convince an obstinate Government that it is necessary for the absurd restrictions regarding alcohol fuels to be amended?

Capt. Vernon Busby.

Capt. Vernon Busby's father writes us stating that his son was not mobilised, but travelled all night to reach Birmingham to enlist on August 6th, 1914, and went to France four days later.

Spring Frames.

"It is virtually certain that after the war there will be put on the market not one but several spring frames that will meet the requirements of users in this country and overseas."—*Bicycling News.*

A New Model.

Most of those in the know in motor cycling matters think that the flat twin will be the solo engine of the future, and there is no doubt that one of *the* flat twins will be the new model Brough. This, which exists complete only on paper, but of which the engine has undergone very thorough bench tests, is one of the most fascinating and well-thought-out designs we have seen. The utmost care is evident in the working out of every detail; even the frame lugs are tapered so as to prevent unsightly corners where they join the tubes, while the engine is now carried in a duplex frame cradle, which is detachable, so that the whole power unit may be removed *in situ* with its supporting tubes.

Equipment.

Signs are not wanting that our suggestions on the turning out of machines complete with equipment are meeting with approval. The new Brough model, for instance, is to incorporate a Lucas dynamo lighting set as standard, the set being an entirely new one designed primarily for use on solo machines. The new Brough also uses 28in. × 3in. tyres (but the height of the saddle is only 29½in. from the ground), an internal expanding rear brake and a front brake of the Lea-Francis type, and a special steering head and front fork adjustment.

Induction Pipe Design.

We have on several recent occasions indicated the necessity for some form of induction pipe heating on post-war machines. In the new model Brough this matter is fully looked after, and the design adopted should prove most efficient, for heat is obtained both from the cylinders and from the crank case.

Another interesting little detail about this striking machine is that the solid crankshaft has ⅝in. square roller bearings, and all ring has been eliminated from the outside flywheel—a bugbear that many makers have unsuccessfully fought against.

Power.

The new Brough engine, though only of 500 c.c., gives 14 h.p. at 4,200 r.p.m., and has attained the extraordinary speed of 5,600 r.p.m., the power output at this speed being 13.2 h.p.

Petrol at Atlantic Ports.

Petrol costs the Allies 11¾d. per gallon at Atlantic ports.

The T.T. Red Flag.

"Arguing that alcohol has long been the stormy petrel of politics, a correspondent of the *Licensed Victuallers' Gazette* considers that the possibilities of ensuring a home-produced motor fuel might be increased were alcohol to be called benzoated hydrocarbon or B.C.H. Although the suggestion is made somewhat facetiously, there may be something in it!"—*The Autocar.*

Capital, Labour, and the Millennium.

We have already referred to those innumerable committees working with the excellent end in view of ensuring the millennium for us all after the war. One of these committees has now come forward with several rather sensible suggestions, the underlying point of which is that the Government should only take action in commercial matters after consulting a joint body representative of both employers and workpeople. As this committee points out, any Orders issued by the Government on the joint advice of both parties should be likely to find general acceptance. Whether the actuality will work out to the ideality is a matter that only test can prove, but all these schemes and their promoters deserve at least a fair trial.

As the present is such an ideal time for experimenting with all kinds of schemes, it is suggested that the following policy should be immediately adopted: "That the Government will undertake to obtain, and wherever possible accept, advice on these matters from bodies equally representative of both labour and capital."

New President and Vice-presidents of the S.M.M.T.

Mr. Albert Brown, of Messrs. Brown Bros., Ltd., has been elected president of the Society of Motor Manufacturers and Traders, and Messrs. Frank Lanchester and T. H. Woollen have been appointed vice-presidents.

The Indian Flat Twin Lightweight.

Elmer Bergstrom, on an Indian light twin, created a new record on May 23rd this year by riding 799 miles in twenty-four hours on the Tacoma Speedway, and would have done better but for a fog that compelled him to cut down his speed to the safety margin during the night.

To run on Paraffin.

Anticipating a potential demand for a sidecar combination that will run on paraffin, a designer in the Midlands is designing a special engine for this purpose. It is larger, heavier, and has a lower compression ratio than the conventional type of engine.

American Motor Cycle Scrap.

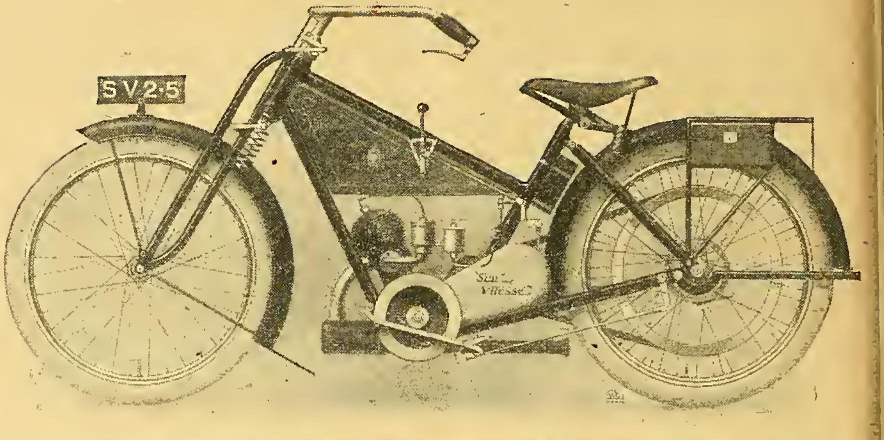
It may be remembered that last summer we had an interesting article in this journal describing the accumulation of motor cycle scrap resulting from the hard work British Army motor cycles have had to undergo behind the British lines. The same thing is happening to the American machines. In a recent copy of an American journal which has reached us there is a photograph of a group of Indian sidecars smashed during service with the American forces in France. There is evidence that these machines are being overhauled and restored in the same efficient manner as our own.

THE MOTOR CYCLE AS HAY CART.

Mr. Prothero asks that the grass that grows on the country wayside should be gathered. Parties of men have now been organised to gather the grass on Sundays, and the photograph shows a 4 h.p. Bradbury carrying the grass to the rick yard.

THE POST-WAR SUN-VITESSE TWO-STROKE.

An Entirely New Lightweight embodying many Striking Departures from Accepted Practice.



This new model, with an inclined engine unit, is quite distinctive from former Sun machines. The two-speed gear box mounted above the chain stays gives an almost straight line of drive.

NEW models are few and far between in these days; there is therefore added interest in the new lightweight which is to form one of the chief items in the after-the-war programme of the Sun Cycle Co., of Aston Brook Street, Birmingham. This firm, in conjunction with the makers of the Vitesse engine unit, have gained a reputation for sound work in past years, and their lightweight should give much satisfaction.

They have effected a complete redesign, and the result is a mount of appearance altogether different from that of the former Sun-Vitesse models. Primarily, it is intended to be produced at a remarkably low figure. One model only is to serve for riders of both sexes, and simplicity throughout is the chief feature.

The designer of this model is Mr. J. Duffy, manager of the Valveless Two-stroke Engine Co., Ltd., Broad Street, Birmingham, who has had a long experience with two-stroke machines. He holds that there is still much to be learned regarding the simple two-stroke engine, and he believes that most of the usual faults can be eliminated by careful design and the study of various points, such as the ratio of crank case compression to cylinder compression.

The frame is a type of loop complete in itself; that is to say, its strength is unaffected, whether the engine is in place or not.

The Power Unit.

The cylinder is of usual construction, except in one or two minor details, but it is inclined forward at about 27° to the vertical. The crank case bolts solidly into the frame lugs without bearer plates. It has a one-piece aluminium casing having a bearing on one side only—a well-tried method which is perfectly satisfactory. The bearing is of considerable length, plain phosphor-bronze bushed for most of its length, with a ball bearing on the inner end. The other side of the crank case consists of a movable cover plate held in place by five bolts. When this is removed and the cylinder lifted, the whole shaft, big end, connecting rod, and piston can be dismantled without shifting the crank case. The shaft has a small cover stud screwed into the unsupported end. The big end has a plain bearing; the gudgeon pin is fixed in the little end by a cotter pin, and takes its bearing in the piston.

Magneto Drive and Transmission.

It will be seen that all these constructional details make for simplicity and reduction in the cost of manufacture.

The chain drive to the countershaft is utilised to drive the magneto—a method which will require much testing before an opinion can be definitely given upon it—but provision is made for a separate drive without altering the design, should the combined drive prove unsatisfactory. The magneto is mounted in an unusual position to obtain this combined drive; it is enclosed in a lug inserted in the down tube, with a hinged clamp over it to facilitate removal.

The gear box is mounted above the frame with the idea of providing as straight a line of drive as possible from the engine-shaft through the countershaft to the back wheel.

This model is designed to allow of easy conversion from single-speed to two-speed, the fitting of the gear box and magneto drive being a simple matter, without alteration to the general build. In the two-speed model, the driving chain is enclosed in a neat aluminium cover.

The type of gear box has not yet been decided upon, but in all probability a special gear will be made for this particular model. The carburetter is a complete departure from the usual practice. We are not permitted to disclose its details, but it has given extremely satisfactory results for some time past, and it may be destined to play an important part in the elimination of much of the trouble to which two-strokes are prone.

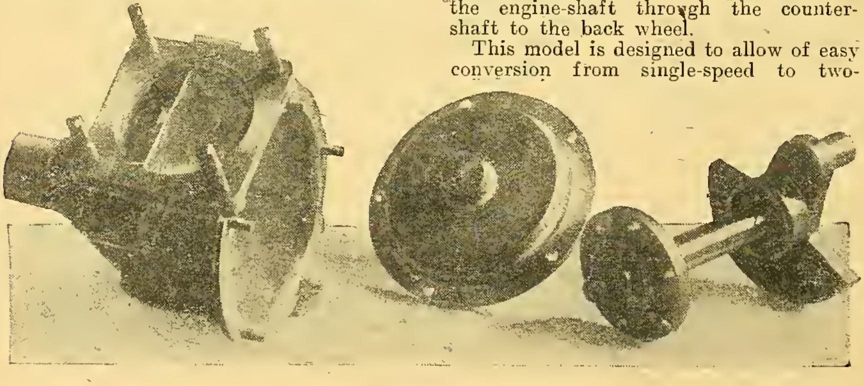
The unusual frame design gives room for a large tank holding nearly two gallons; a separate oil tank is fitted under the saddle on the down tube. Lubrication is by drip feed in the usual way, with one lead to the cylinder wall. After being used there the oil drops into a small reservoir formed in the crank case casting, from which oilways are drilled to the main shaft bearing. A drain plug is fitted to the crank case sump.

The front forks are simplified, and consist of two tubes of similar shape on each side, a point which aids manufacture and lessens the cost. Aluminium footboards and front and back brakes of the internal expanding type are provided, the back brake being operated by a left heel lever and the front by Bowden cable from the handle-bars.

Price and Production.

There are many points in this new model which may prove distinct advances on previous two-stroke design, and the Sun Co. are hoping to produce it in large quantities when the motor cycle world comes into its own again. It is early to talk of prices, as the future cost of materials and labour is quite impossible to estimate at present, but if the cost of production returns to something approaching the pre-war basis, the price of a single-speed model is likely to be nearer £20 than £30, and the two-speed model about £5 or £6 more.

Such a promising design should certainly form a distinct forward step in the progress and popularity of the post-war two-stroke lightweight.



The crank case with cover removed. Note the small oil reservoir above the shaft bearing. The shaft is shown with the boss of the outside flywheel attached.

THE MOTOR CYCLE AVIATION SECTION

The First Airship.

Giffard, a Frenchman, constructed an airship driven by a 5 h.p. steam engine in 1852.

R.A.E.

Probably few people know that the huge aircraft factory, which up to April last was always known as the R.A.F., is no longer so named, but has been officially rechristened R.A.E.—Royal Aircraft Establishment—presumably to distinguish it from R.A.F. (Royal Air Force).

The King.

The King recently visited one of the large aircraft repair depots, Royal Air Force, in England. During his tour of inspection to the Motor Transport Repair Section, His Majesty made a special point of visiting the motor cycle repair shops, in which he showed a keen interest, spending some little time chatting with several of the mechanics.

Royal Air Force Decorations.

It is officially announced that the colours of the ribbons of the new R.A.F. decorations and medals are as follow:

Distinguished Flying Cross, purple and white.

Air Force Cross, red and white.

Distinguished Flying Medal, purple and white.

Air Force Medal, red and white.

The ribbon will in all cases be worn so as to show a coloured band at the top.

One Thousand Horse-power Bombing Machine.

The four-engined German bombing machine which was brought down by the French near to Nanteuil-le-Haudouin is a copy of a Russian model with which experimental flights were made before the war. The following particulars of the reconstituted machine appeared in a recent number of our French contemporary *L'Auto:*

The motive power consists of four six-cylinder water-cooled engines of 260 h.p., two driving screws of the pusher type, and two driving screws of the tractor type. The armament comprises four machine guns—two mounted forward and two aft—and the bombs carried weighed three tons. In flight order, for a journey of five hours at a speed of about 70 m.p.h., the total weight with 660 gallons of petrol and a crew of eight is 15 tons. The crew is composed of a captain, an observer, two pilots (with connected control), a wireless operator, and four gunner-mechanics. The body is divided into two compartments, communicating by means of a side passage.

Hun Slang.

The German flying men called an aeroplane a "box," as compared with our word "'bus." A big bomber is an "apple barge." The body of the machine is the "shop window." An alternative slang term for the machine is "packing case" (many German planes have fuselages cowled and faired with plywood). Bombs are "liver sausages" or "eggs."

Hun Raids on Hospitals.

The recent Hun bomb and machine gun attacks on our hospitals in France form yet another example of his ruthless logic in warfare and his absolute contempt for his own plighted word. Our hospital system in France was enlarged, partly to counter his torpedo attacks on hospital ships and partly to save tonnage. His raids on Etaples and other Red Cross centres are simply designed to force us to use tonnage in transporting our wounded, or, alternatively to hamper the French railways. Before long he will realise that the new policy appals the few remaining neutrals, and he will then produce some plausible yarn that we use the Red Cross to protect our base dumps of ammunition, etc.

Stampeding the Transport.

According to recent information, one of the most successful dodges for pilots who are sent to raid enemy communications in daylight takes the form of ignoring the infantry in a marching column and stampeding the transport. A few well-placed bullets or a single, small, deftly aimed bomb may stampede a team of horses harnessed to a heavy waggon.

A Pitfall for Tyros.

The embryo pilot does not easily grow accustomed to putting his joystick back in neutral after a momentary correction of his "trim." It is rather difficult to explain this subconscious trick, as motorists naturally straighten out their steering after a divergence. Possibly the cause is that the joystick reminds the beginner of a gear lever.

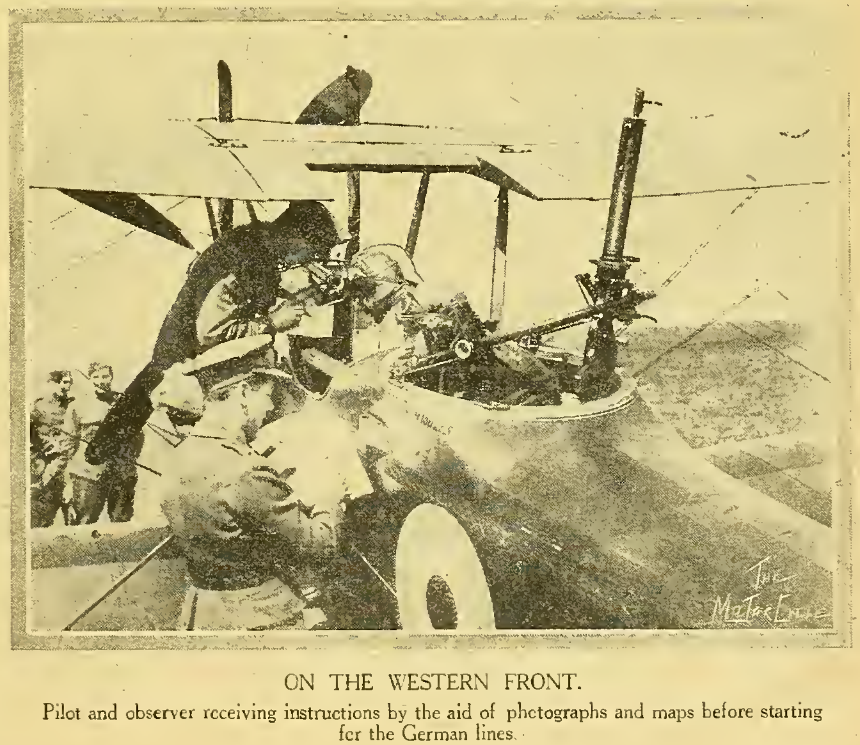
Questions We Dare Not Answer.

How do anti-aircraft gunners distinguish between British and German planes at night?

How does a defending British pilot ascertain whether the planes he views are Gothas or not?

When shall we bomb Essen?

When shall we bomb Berlin?



ON THE WESTERN FRONT.

Pilot and observer receiving instructions by the aid of photographs and maps before starting for the German lines.

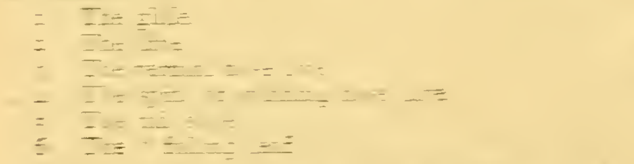
STUNT FLYING

PART V. By "Torque."

In this instalment our contributor describes several methods of descending.

The [illegible] stunts described in the last instalment may be used as a means of dropping a [illegible] feet or so. As most of our [illegible] [illegible] "stunt" descents are seldom desired or safe; they would bring [illegible] within reach of [illegible] guns. A short drop [illegible] is a very different matter, and [illegible] to get a machine out of a tangle, and [illegible]. [illegible], on the other hand, when fighting over his own soil, frequently indulges in quick descents, sometimes to get away as fast as possible, sometimes to tempt our men to follow him over a nest of concealed guns. There is great variety in the methods of descending, though these may be tabulated:—

Fig. 2.



Normal gliding angle. Nose dive. Vertical nose dive.

1. The glide.
2. The dive.
3. The vertical nose dive.
4. The spin or spinning nose dive.
5. The tail slide.
6. The "falling leaf."

The "glide" is the normal method of descent, and [illegible]. In a glide a pilot merely [illegible] down his engine [illegible] and the [illegible] with the nose falling, along a path slanting downwards at an angle of about 1 in 8. During a descent gravity soon takes up the work performed by the engine in flat or climbing flight, and provokes a reaction from the planes. This reaction is not powerful enough to render flat flight or climbing possible, but it cushions the descent. The machine glides safely and comfortably earthwards at its "natural gliding angle," which may be somewhere about 1 in 8. The pilot can increase this gliding angle by any amount up to the vertical at his pleasure; he has merely to lift the tail up by using his elevators, and at one time the term "dive" was reserved in flying parlance for descents at a steep angle. Similarly the speed of a glide or dive can be affected by keeping the engine fully on. Finally, the path of the dive can be modified by the use of the rudder. In all stunt descents the limit is fixed by two factors. The first is the altitude from which the descent is made; the second is the amount of stress which the structure of the machine can stand. To name examples, all the steep descents have to be converted into glides before safe landing or a resumption of horizontal flight is possible; and the conversion of a steep angle into the natural angle occupies some distance. Secondly, when a machine is flattened out of a vertical nose dive into a glide, a colossal strain is thrown on the controls, the planes, and the bracing wires. A machine which is damaged by gunfire, or is aged and somewhat feeble in its parts, cannot be subjected to such stresses.

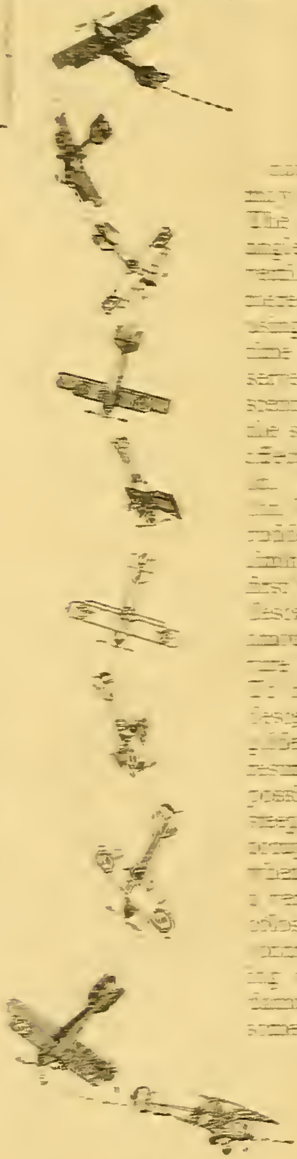


Fig. 1.

The spinning nose dive.

The Spinning Nose Dive

The spinning nose dive is a continuous spiral descent, and has already been described in *The Motor Cycle* under "Flying Feats and Tactics." It is obtained by throttling down the engine and stalling the machine with the rudder hard over. [illegible] it was thought

Stunt Flying.—

impossible to extricate a machine from a spin. To-day it is a deliberate manœuvre. The early machines often met their doom in spins, for two reasons. The first was that, when a machine spins, the rudder and elevator "change places," as the cant term is. More accurately, when a machine is tilted over on to its side, the elevators begin to control its side-to-side motion instead of the fore-and-aft inclination, which is their normal business; and simultaneously the rudder surrenders control of the side-to-side motion to the elevators, and steals from them control of the fore-and-aft motion. This was very disconcerting to pioneers experimenting in a new science. If they had thought the matter out previously to ascending and could have kept their heads when the dizzy spin suddenly developed, they were still up against a purely practical difficulty. The machine had not spun far before it developed a special spinning momentum, which made it extremely loth to resume the straight path; and the leverage of the control surfaces was insufficient to overcome this spinning momentum. With modern controls a pilot can wrench a machine out of a spin; or if he centralises his controls, the 'bus will do it on its own.

The tail-slide is less mysterious than other stunts. The elevator is used to force up the nose of the machine till it is trying to climb at an impossibly steep angle. It will eventually stall, with its longitudinal axis nearly or quite vertical. Gravity will then get to work, as the planes are in no position to furnish lift, and it falls like a plummet, tail first. The natural nose heaviness gradually pulls its nose down, and if it had sufficient altitude at the commencement of the slide it merges harmlessly into a normal glide.

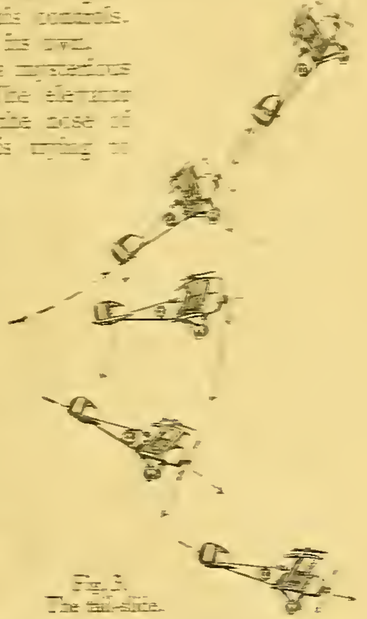


Fig. 3.
The tail-slide.

The Falling Leaf

The "falling leaf," like the "roll," belongs rather to the catalogue of exhibition tricks than to the list of fighting stunts, and is perhaps the prettiest in the trick-flier's bag. The nose of the machine is tilted up just enough to prevent a normal glide developing at once, and the engine is throttled down. The machine will then drop more or less vertically until it gets its nose down and develops a glide. As it drops the pilot works the wingtips to rock it gently from side to side, first over towards the right wing tip, then towards the left, and so on. The distance during which this tumble can be maintained is limited, of course. As forward way is lost, the elevators can no longer be used to keep the nose up, and the "falling leaf" ends in a glide, as the powerful weight in front pulls the nose down.

The fighting value of these stunts varies. In manœuvre it is the unexpected that tells. The pilot who stalls his machine when an enemy is diving at him is merely reading a leaf from the book of the footballer who stops dead to evade a rush tackle. It is even conceivable that to glide a few hundred feet at the slow natural angle and in a straight line might disconcert an attacking foe, who might be expecting some very complex manœuvre. As I said before, to keep the enemy guessing is the golden rule, and it is probable that every conceivable stunt is occasionally employed in warfare, though the favourites are those which facilitate lightning changes of altitude or direction, so that the rapid forms of descent are used at least a thousand times for every once that slower loops are resorted to. The steeper descents are very apt to over-oil the front cylinders. This point is a help when one is trying to escape with a Hun back; the smoking exhaust may delude your assailant into fancying you are on fire. But it is a grave danger when you are over the Hun lines, and a frightful nuisance if you intend to attack again in a moment or two, as one or more plugs may oil up when you recommence to climb. Consequently, really steep dives are usually broken off after a short drop unless the pilot is trying to escape.

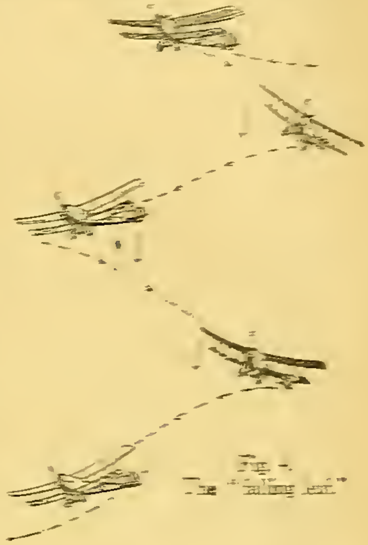


Fig. 4.
The "falling leaf."

It is, of course, possible to achieve fiendish speeds by diving steeply with the engine fully on, and all pilots are nervous of what can be done in this line. There are three dangers in such an act. The first is that the plane itself will collapse when it is pulled out of a dive at speeds approaching 200 m.p.h. The second is that the engine will be revved up to speeds for which it was not designed, and something may "give." A third is that it is not good for even the finest physique to undergo marked changes of atmospheric pressure in a very brief period.

CHEAPER THAN A CAR?

According to Mr. G. Holt Thomas, a small aeroplane is considerably cheaper to run than any car. A machine capable of 100 m.p.h. and of carrying a load of 250 lb. (including the pilot and fuel) can be maintained (including repairs, housing, etc.) for an average sum of 1½d. per mile, and therefore represents the cheapest form of long distance locomotion, with the two exceptions of the motor cycle and third-class travel. The housing of an aeroplane, however, would be the most difficult question to some

RICHTHOFEN'S DIARY.

(REVIEWED BY "TORQUE.")

AN APPRECIATION OF A GERMAN AIRMAN.

MR. C. G. GREY has done us all a service in translating and publishing the diary of Baron von Richthofen, the crack German scout, who was recently shot down by a British airman after downing eighty Allied machines. The general impression in the R.A.F. is that the dead baron was a gentleman, and, as far as German military orders permitted him to be, a sportsman. Accepting this impression as just to his memory, the slimy trail of a propagandist Hun editor is smeared over what remains of the simple, boyish pages of this dead hero's diary. Here and there a page still stands as originally written, and rings true, as, for example, the record of his hero worships when he was an obscure subaltern, his sorrow at leaving his pals when he was transferred, his experiences in his first solo flight, and his first fight. For the rest, by suppression and insertion and ingeniously faked implications and innuendoes, his ingenuous record has been marred by the hand of some psychological underling. With this reservation the book is splendid reading: and any reader sufficiently sophisticated to trace the hand of the official German editor will take a real liking to the lovable boy whose brief career as a soldier is *camouflaged* in this book.

To quote instances of suppression, superficial reading of the book creates the impression that Richthofen was in the daily habit of shooting down one or more English pilots before breakfast. The Baron made his first flight over the lines in June, 1915, and was killed in April, 1918. By implication he shot down over 1,000 Allied machines: in sober fact his bag averaged rather under four per month. He is further made to write as if he wandered about alone, or with perhaps one companion scout, searching the vacant air for enemy planes. On occasions the German pilots unquestionably fight like tigers, taking all risks: when a push is afoot the Hun Higher Command does not spare pilots or machines. But neither Richthofen nor any other German pilot normally pursues the offensive regardless of danger. Fritz is, above all things, logical. He has fewer machines than we have, and his machines are not so good. His correct policy is to conserve his flights, whilst missing no chance of weakening ours by a prudent war of attrition. So in normal times and on quiet sectors the official Hun tactics are somewhat as follows:

(1.) To fight, as much as may be, behind his own lines.

(2.) To confine attacks to surprise dives, and to go down if the surprise swoop fails.

(3.) To patrol in large formations and restrict solitary fights to special emergencies.

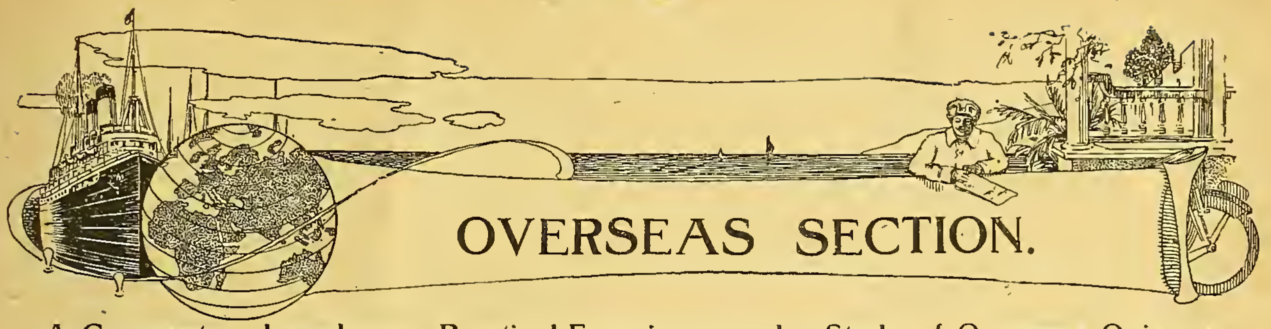
(4.) To keep a sharp look-out for damaged Allied planes.

Whether the baron liked these tactics is another matter: his General would see that he adopted them, except when an aerial push heralded an infantry push, and bolder deeds were essential. But for these tactics the baron would never have survived for $2\frac{3}{4}$ years. Moreover, being logical enough to adopt such tactics, the Hun is logical enough to see that an honest admission on the point would make poor reading in Entente and neutral countries: so the exact reverse is suggested throughout most of the book.

It would be very interesting to know whether the Hun censor has excised the baron's more recent references to Allied men, machines, and methods. What is said is extremely contemptuous. The British pilots appear as foolhardy and inexpert: the French as cowards and given to shady tricks. These references are possibly authentic. In his earlier days the baron undoubtedly met a number of British pilots whose training had been grossly inadequate, especially in gunnery: and we can guess how bravely these half-trained boys went to meet death at the hands of a man who had training and experience behind him.

The diary cunningly implies that casualties in the German air service are practically unheard of, and that when they occur they are due to sheer bad luck. As edited by the German Censor, the book is a magnificent example of wily Hun propaganda, and it is rather a pity that it has been allowed to appear in English without a covering preface pointing out in downright fashion that the work is, on the whole, a cunning fake.

R.A.F. men salving bombs from a wrecked German aeroplane brought down on the Western Front.



OVERSEAS SECTION.

A Commentary based upon Practical Experience and a Study of Overseas Opinons.

Clutches for Overseas Mounts. It is difficult to arrive at a decision as to which is the best type of clutch to withstand the continuous stopping and general hard usage to which this component is often subjected Overseas. Naturally, the best design of clutch is one having a very ample friction surface, so that it operates under light pressure, thus reducing the grinding process to which the surfaces are subjected, but the question as to the best material remains.

In the early days of improved transmission small clutches were the common order; one can recall heavy tricar outfits having cone clutches no larger than saucers, and motor cycles with the same fitment, but of even less diameter, with the result that even with the enormously powerful springs employed slip was inevitable and the friction faces literally peeled away. The multiple-disc hub clutch was the next step, and though this afforded a much greater friction surface it ran at such low speed and was subjected to such heavy torque that its gripping powers generally proved inadequate. To-day we have the countershaft high speed clutch of large diameter, operating under moderately light pressure, and giving entirely satisfactory results under the normal conditions of riding.

But the conditions Overseas are not always normal, and often the clutch comes in for more than its share of abuse. Should it be unreliable in operation the gear box suffers, and on its wearing properties largely depends the general reliability of the machine. Even though the clutch be sufficiently large, it must be made of the proper material to withstand the hard wear it is likely to receive, and it might be worth while briefly to review the various types of clutch employed in present-pay practice.

* * *

Present-day Designs. The dry plate cork insert clutch is one of the most popular types, and for the highways and byways of Great Britain it is excellent. This type has won its popularity chiefly on account of its sweetness of engagement, though its simplicity and cheapness of production have perhaps had no little to do with it. In the universal model, however, the cork insert clutch falls short of the mark in that it is not indestructible. The corks can be reduced to the smouldering point with comparatively little effort when a heavy load is carried over extremely difficult going, and though in England this point may never be reached during the ordinary course of touring, we ourselves have known it to occur—not merely once, but often—under extreme conditions. The cork inserts wear well and are comparatively easy to renew, no fresh part being required from the makers, and while this is a great point in their favour, the heat question is a serious drawback.

Next we have the dry plate clutch furnished with a fireproof and renewable lining in conjunction with metal—American pattern. This type of clutch is, if anything, better than the cork insert variety, in that it cannot be burnt out, but its wearing properties are not equal to those of the metal-to-metal wet plate clutch. Also, in common with other types of clutch, the surfaces of which permit a certain amount of yield, the point of "take off" is somewhat indefinite, and the delicacy of control rather a matter of speculation. It is, however, an excellent type of clutch, perhaps better adapted to the heavy and powerful type of mount than to the light solo machine.

* * *

The Metal-to-metal Clutch. Lastly, we have the metal-to-metal, probably phosphor bronze to steel, wet plate clutch. This is a type we have always favoured on account of its wearing properties, its indestructibility, and its smooth action.

One great point in favour of the metal-to-metal wet plate clutch is that the plates being thin, a great number can be packed into a very limited space, with the result that a very large friction surface can be obtained, and consequently a light spring used, hence its adaptability to hand control. The objection to the type is that, unless the adjustment be perfect, the clutch is never quite free, which is extremely bad for the gear box and not very convenient for the rider.

Though it is practically impossible for this type of clutch actually to cause failure, it is not without its drawbacks. The oil film between each plate is a matter of theory only after an hour's stopping, and thereafter the plates are run dry. To obtain good results from a metal plate clutch it should be propped open when the machine is left standing after hard use, as this permits the little lubricant that may be about to regain the friction surfaces, but the fact remains that for 70% of its time the metal plate clutch is running dry, so the question arises as to whether it is worth while to make any provision whatever for oiling it. Would it not be better to design and construct the clutch to run without lubricant?

From the Overseas riders' point of view, the objection to the metal-to-metal type is that it is necessary to keep a few spare plates in hand. Though a hardy clutch, in one way it is a more delicate one than the composition lined, because, after a certain point, there is nothing for it but renewals if perfect operation is to be resumed.

Overseas Section.—

A Desirable Design.

SUMMING up, then, the choice lies between the dry plate composition-lined and the wet plate metal-to-metal. The former demands no special provision in the way of an oil-proof front chain case, while the latter does. The latter, however, is infinitely more applicable to handle-bar control—not only on account of the lightness of the spring that can be employed, but because there is no yield on the friction faces, and therefore a very small range of movement is necessary. In the Overseas model, however, the necessity for spares should be cut down to an absolute minimum, and it is easier to purchase a square yard of composition lining than it is to obtain specially cut plates.

We have arrived, then, at the fact that every type of clutch wears out and requires renewals. What should be aimed at in the Overseas model is to provide a clutch, whether wet plate or dry plate, which will *not* wear quickly. If six plates are considered necessary for British use, then at least nine plates will be necessary for use in pioneer lands. Because a machine has stood the most scorching six days' test in England it is by no means certain that it will stand up to Overseas use.

IN THE LAND OF THE VINES.

A convoy of motor cycle machine guns in Italy led by an officer on a W.D. Triumph. Little has been heard of late of this particular arm, but it is doing good work on many fronts.

A Selection of Letters from Readers scattered all over the World.

A Two-stroke in N.S.W.

MR. G. W. ANDERSON, of Gilgandra, New South Wales, writes the following appreciative letter of his experiences with a Connaught two-stroke:

"I take great interest in your paper, *The Motor Cycle*. The only trouble is that it does not come regularly enough, as sometimes I do not get it for months, and then four or five at once. Many do not turn up at all.

"I thought I would let you know of my experience of my Connaught motor cycle. I have had it nearly two and a half years, and have done 7,000 odd miles, and the engine has cost me only 7s. 6d. for new small end bush and 2s. 6d. for new piston ring, which speaks well for the simplicity and few working parts of a two-stroke. I have an Albion two-speed gear, but very, very seldom use second gear, as there is plenty of power in the engine to go anywhere on top. I always average 125 miles to the gallon, and this is not done by any faking, as the carburetter is set exactly the same as when delivered to me. This mileage is registered by a Corbin-Brown speedometer.

"*Re* two-stroke rattle, I always find that the Connaught starts to rattle as soon as the top ring starts sticking in the piston ring groove, and the rattle always disappears as soon as it is cleaned. I have found this always without fail. The only objection I have is that the lubrication is messy, but there is no doubt that it works well. As for four-stroking, I never get a sign of it. The carburetter is an Amac with 24 jet.

"I can average 20 to 30 m.p.h. without any sign of overheating or petering out. The flexibility of the engine is simply marvellous, as the roads are bush tracks and very sandy in places, and the sandy patches are where one appreciates flexibility. The original belt is still in use and looks practically new. I have fitted two new tyres."

War Lessons and the Machine of the Future.

Although not an "Overseas" letter in our usual interpretation of the term, the following communication from "ELDON," B.E.F., France, is given here, as it deals primarily with Overseas matters:

"May I be allowed to air my views on your article dealing with the subject of 'Overseas Trade after the War' in your issue of May 30th?

"It is all very well to say that British manufacturers may have been brought, through war requirements, to see the possibilities of 'quantity' production, but what about the radical changes in design which have been proved necessary by the tests of war work with the various Expeditionary Forces? The requirements of the Overseas market have for years been drummed into us by our Colonial brothers, and the war has completely demonstrated the truth of their complaints.

"The Army authorities no doubt have excellent arguments in defence of their refusal to allow any alteration in the design of motor cycles supplied to them, but the fact remains that, owing to this refusal, the many improvements which could, and no doubt would, have been made have been denied the splendid trying-out they would have received on Active Service. In the case of those manufacturers whose products were not made use of by the War Department, of what

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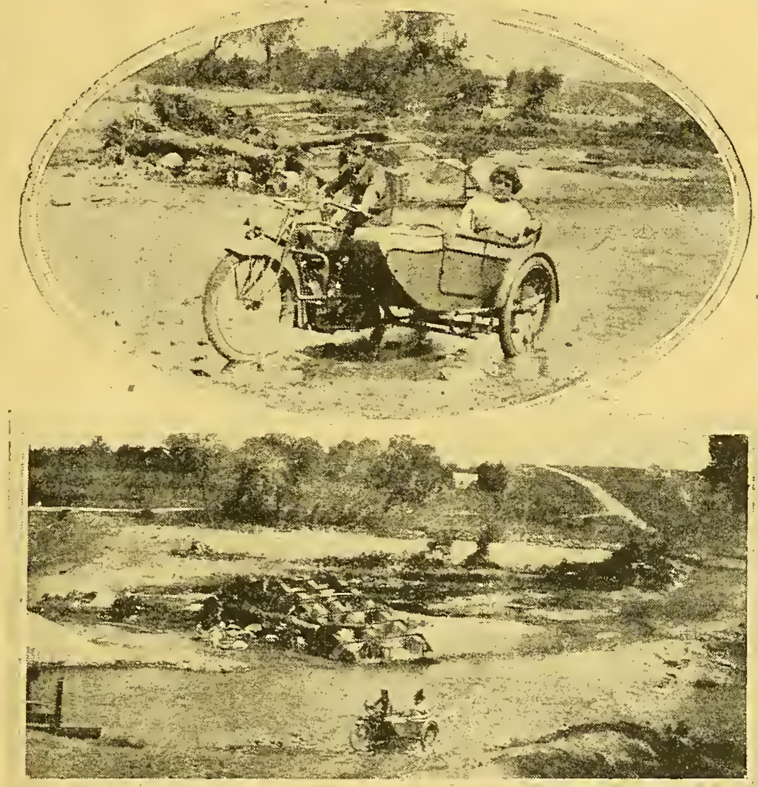
assistance can the war have been to them in finding out the weak spots in their designs?

"Then there must have been dozens of small concerns who had just entered, or were on the point of entering, the motor cycle market when war broke out. Some of these people must have had new and good designs, but, owing to the war, they were squashed, and may never rise again.

"'Quantity production' sounds all very fine and large, but in order to attain it, you must have your market: and in order to get your market, you must have the *right article.*

"So far, I fail to see that manufacturers have learned anything in the direction of radically improving the design of their machines during the war. The 'post-war' models I see so largely advertised look to me very little different from the 1914 models.

"May I conclude by saying that it tickles me immensely to read the gushing effusions in advertisements and elsewhere to the effect that Mr. So-and-so has ridden a — h.p. Triglas for 3,000 miles and had no trouble at all. Three thousand miles! Heavens, I should think not! If I had a modern machine that gave me any mechanical trouble inside four times that distance, I should sell to the first unsuspecting 'mug' that came along."



Showing the devastation wrought by the floods near Johannesburg recently. A heavy girder bridge spanning Crocodile River was completely swept away. The photograph shows Mr. L. Tregoning's Harley-Davidson crossing the drift.

Roads in the Johannesburg District.

MR. L. TREGONING, writing from Mayfair, Johannesburg, says: "I am sending some photographs which may perhaps interest you as showing the effects of the recent heavy rains. Most of the roads outside the town are in a pretty bad state. The photographs show the bridge at Mulder's Drift before and after the floods. It is situated about nineteen miles from Johannesburg, and spans the Crocodile or Limpopo River about six miles from its source. The flood at its highest was well over the hand rails. All traffic has now to use the old drift, where the motor cycle is seen. It is a fair specimen of a South African river crossing.

"Some correspondents who write regarding Colonial models seem to want a Rolls-Royce ambulance, or, better still, an ox waggon. I see one wants not less than 8in. ground clearance. Perhaps he would like the engine on top of the tank.

"I wish your valuable paper every success."

English and American Machines in Canada.

The following is a further contribution to the subject raised by Mr. Warne, of Toronto, in two previous letters:

"I notice in *The Motor Cycle*, Overseas Section (April 25th), Mr. W. R. Warne, of Toronto, Canada, is answering the criticism of his letter written October 25th, 1917. I may state that I also hail from Canada, and Toronto happens to be my home town. I wonder if the Editor, or some reader, would be interested enough to drop a line to the T.M.C., Toronto, enquiring just what make of machine Mr. W. R. Warne did ride. I have had the pleasure of riding Triumph machines from the fixed engine 1911 plugger stage to the 1915 three-speed model, with and without a sidecar, over all kinds of roads, and not once in those five years of 'experimental' riding on five different models did I have a single breakdown or a moment's delay. Since then, and between those dates, I have ridden nearly all of the American makes —if not all—and I am sorry to say the same 'record of service' cannot be given to them.

"I was the owner of a 1914 American 7-9 h.p. twin, single gear of 4½ to 1. This machine was used entirely as a solo machine for over a year. During that time it was driven at very high speeds over the worst roads in the country—sand, rock, and mud. When this machine was sold it was ready for the scrap-heap, being beyond repair.

"Now the Triumphs were given practically the same abuse and not one failed. When they were finally sold they were equal in reliability to new machines, if not in looks, and now I want it understood that I am not limiting myself to one machine as a 'test example.' Far from it. I claim any American machine will wear out under the same strain long before a good English-made ''bus' will, and people who have ridden both types *hard* will back me up in all I say.

"Except as a private rider, I have no other interest in Mr. Warne's letter.

"This much from

A ROUGH-RIDING
CANADIAN."

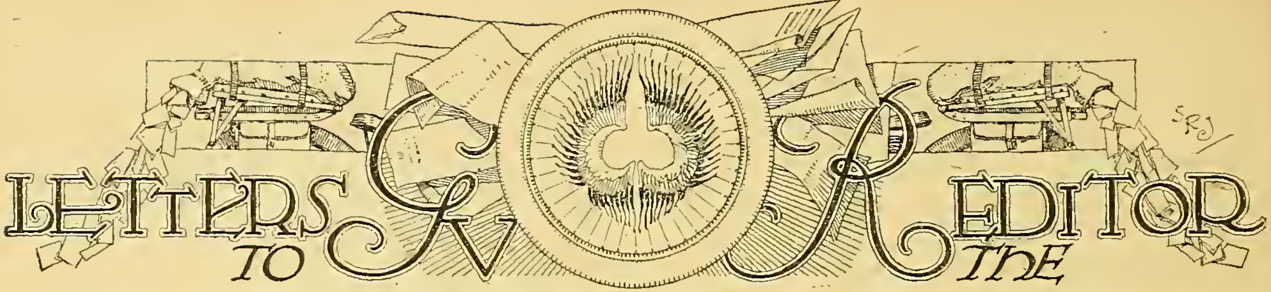
MR. W. GREENWOOD, of Toronto, sends us the following further contribution to the above discussion:

"In your issue of April 25th Mr. Warne seems surprised that all the British makers are not tumbling over one another to get his advice, as only one wrote him. I think the makers will hesitate before they establish showrooms, workshops, stores, and offices in Toronto, with branches in Montreal and the Western capitals, as he suggests. Why the principal headquarters in Toronto? Montreal is a larger city, and all goods are landed there. Why bring them to Toronto and then have to send them back to the Montreal depôt—330 miles? There is no doubt that the originator of this great scheme would be consulted in this matter. Mr. Warne quotes me as saying: 'In the pre-war competition only two British machines competed.' I said that *two Triumphs* started and finished first and second. What would Mr. Warne have said about the preponderance of the American machines had I quoted the following?

"'T.M.C. HILL-CLIMB.

"'From *Canadian Motorcycle*, January, 1913.

"'A significant feature of this event was the fact that all the contestants rode British mounts, the Triumph being almost universally used, with the exception of one rider who rode a Rudge. British machines with their small wheels are admirably adapted to work of this kind, and that they could take the steepest hills without trouble was made evident by the manner in which they took the test hill which was as steep as the majority encountered in country riding. The speed at which the hill was climbed by the various contestants can be closely guessed at when it is known that to do the distance in 25s. a speed of 26 m.p.h. was necessary. After the trial one competitor rode up the hill in 22s. dead, or over 30 m.p.h. The hill is 960ft. long, and has a grade of 1 in 6.'"



LETTERS TO THE EDITOR

The Editor does not hold himself responsible for the opinions of his correspondents.

All letters should be addressed to the Editor, "The Motor Cycle," Hertford Street, Coventry, and must be accompanied by the writer's name and address

HYDROGEN FROM WATER.

Sir,—I have followed the discussion *re* hydrogen as a fuel, and have come to the conclusion that the following might be of some use. Why should not an accumulator be used, as I have electrolised water in a U tube by means of one with good results? The tank could be lined with porcelain or glass, and a pipe let in at the top to convey the gas to the induction pipe. I fail to see why this could not be used with, at any rate, partial success. Both oxygen and hydrogen would be used, both going through the same pipe. I may add that I have *not* fitted it to my machine, and it is purely theoretical. HENRY CLAY.

Sir,—I was much interested in "Pilot's" letter. Like everyone else, we suffer from the petrol restrictions, but for some time past we have been experimenting with water as a fuel. The alterations have been made on a 7-9 h.p. twin.

At first we had no voltmeter to test the magneto with, but one bright youth volunteered to try with his tongue; we now work unmolested. By pulling a string an ingenious arrangement of rollers, emery paper, and friction discs is set in motion, and after about ten minutes' work the cylinder heads become red hot. These boil the water situated in little tanks above them, and the steam passes through a network of tubes into the frame. In the frame we have seccotined an immense quantity of iron filings, and as the steam passes over these the oxygen combines and the hydrogen goes on its weary way. By means of scoops and blowers the hydrogen is brought into the cylinders and fired by the red hot heads. On this machine we can reverse; it all depends on the compression. If we tighten up the cylinder holding-down nuts we get normal compression and pre-ignition, and back we go. If we slack off the nuts we get low compression, and it works splendidly. We cannot understand why "Pilot" gets his misfiring, as we indulge in speeds approaching 90 m.p.h., and we think he must have a worm on the needle valve of his top feed carburetter. CADET.

Dartmouth.

THE SINGLE-CYLINDER IN COMPETITIONS.

Sir,—Anyone who is guided by facts, and not by fads or fancies, must find it impossible to answer the able article by Dean Barry in favour of the single. Unfortunately, there are a great number of people who *will* vote for anything new, no matter whether it is an improvement or not. To-day, the single still stands unrivalled as the most efficient and practical machine on the market. There is one point, however, which I think your correspondent has overlooked. He seems to infer that for sidecar work the choice lies between the over-powered big twin and the under-powered 3½ h.p. single. Admitting that a lot of pleasure can be got from the latter, it is still a fact that there are many occasions when the rider will want more power. Here, what is, I think, the most practical sidecar mount comes in—the "big single." I can only speak from experience of the Norton, but this machine certainly "fills the bill," and I have yet to find a better. The engine gives 7 h.p. on the back wheel at 1,100 r.p.m., and without racing 10-12 h.p. can be got. This is all that can be got out of the best 5-6 h.p. twin on the market, and the engine is vastly easier to keep in tune, and far less trouble on the road owing to its simple construction and few working parts.

The only fault I have to find with it is its name, the "Big Four"—a remnant of old times when the motor cycle engine was not nearly so efficient as it is to-day.

If an engine of 560 c.c. is called by other makers a "four," it is obvious that one of the 633 c.c. should be called by another name. I have no interest in any motor cycle company, but I think that the big single should certainly be better known and tested. If this were done, I think there would be few twins to be seen on the road.

Beech, Alton. M. HITCHCOCK.

STUNT FLYING.

Sir,—I cannot profess to compete with W. G. Aston either in draughtsmanship or technical calibre; but I rather fancy the point he has raised is mainly one of terminology. I have read his analysis of the "roll," and feel that I have rather rushed in where angels fear to tread, as his inimitable pencil shunned the task of depicting an aeroplane following the path of a "pulled out corkscrew." But I notice that he limits the "roll" to corkscrews commencing with a "zoom." Now, to take an extreme instance, a spinning nose dive might be described as a "roll," being a corkscrew with a vertical axis, whereas Mr. Aston's roll is a corkscrew with a horizontal axis. It is further possible to make a machine follow a corkscrew path with an inclined axis. Are all these manœuvres "rolls"? Mr. Aston would limit the term "roll" to corkscrews with an approximately horizontal axis, or, rather, to a horizontal corkscrew with a wilting tip. Some R.A.F. instructors definitely assert that a "roll" can be performed with the engine on or off. Mr. Aston says it is impossible to "roll" unless you commence with a "zoom." Many Service pilots are dropping the term "roll," apparently because of this ambiguity, and prefer the term "side loop."

I think we should all be interested if Mr. Aston would treat us to a technical analysis of corkscrews with axes of various inclinations. TORQUE.

A SATISFACTORY GEAR BOX.

Sir,—I have seen several appreciations of the A.B.C. engine in your columns from time to time, but I cannot remember any special reference to the A.B.C. gear box.

I have had occasion to dismantle mine recently, and thought perhaps some of your readers might be interested to know how it has worn.

During the last two years and a half I have ridden the machine daily, winter and summer, covering some 20,000 miles, mostly over very bad roads. During this time the clutch had to be adjusted once, and to do this a small nut had to be given three turns. This was the only attention, other than periodical oiling, that the gear box has had till about a month ago, when a slight grinding, which was felt rather than heard, began to develop. On examination, the four self-centring Skefko ball races on which the main and layshafts run, as well as all the spur wheels, shafts, etc., inside the box, were still in perfect condition. One brass bush had developed play to the extent of four-thousandths of an inch (measured by micrometer), and the roller bearing, on which the clutch spins, owing to oil channels getting clogged up and to the breaking of a roller, had developed one-thirty-second of an inch play. Considering the long, hard wear that the gear box has had, I think this is no mean record.

While the gear box was dismantled and on the bench, it happened that two standard English cars, 10 h.p. and 12 h.p. respectively, were in the shop for gear box repairs, and although the A.B.C. box was only half the size and less than half the weight, it was, in my opinion, both stronger and more efficient than either of the others. A.I.C.

DIFFICULT STARTING.

Sir,—Mr. Ellison's tip is capital. I have had four B.S.A.'s, and have nothing but praise for the sturdiness of the mount and its meek acceptance of mud and misuse.

My only grumble is on the score of vibration, and as I am subject to attacks of Anno Domini, I want to know how to save my feet doing a step-dance on the footboards. Terry links ward off neuritis from the arms all right, but anything over 20 m.p.h. castigates my ignorance.

(Rev.) W. M. W. PITCHFORD.

Sir,—I have read the letters in *The Motor Cycle* regarding the B.S.A. 4¼ h.p. machine.

I have owned four B.S.A.'s. The last one—a 1916 model—had 13,000 miles to its credit after seven months from leaving the works. Its repair bill came to a few coppers for a kick-starter crank spring. Tyres, of course, I have omitted, and I have done Manchester to Tynemouth (180$\frac{3}{10}$ miles by Cowey) in eight hours, during the winter months at that. I have nothing but praise for the machine.

To come now to the difficult starting which a lot of big single riders experience. I have generally found when I have been asked to inspect these machines that the trouble was due to the carburetter, the jet adjusting screw being opened too much.

I find the best setting of this for starting is to have it one-quarter open, air lever closed, and throttle a third open, magneto advance lever two-thirds advanced (depending on the slack in magneto driving chain, of course), a few drops of petrol through the compression tap, put engine into low gear, and kick start (a hefty kick), and if the machine is in anything like trim it will start up the first or second kick, and when once running the jet adjusting screw can be adjusted to the correct setting. The B.S.A. carburetter is the finest, in my opinion, fitted to any motor cycle, and the B.S.A. machine throughout is one of the most easily adjusted on the market. I only know of one nut that is at all difficult to get at on the machine. I ride all makes, but I always get on a B.S.A. with the knowledge I shall have a good run.

To those who do not mind using a little more oil, and have the time to do the extra decarbonising it entails, I should like to say that the B.S.A. engine can be flooded with oil, and seems to revel in it.

The B.S.A. front belt rim brake if lubricated and adjusted properly is a most efficient one. E. FOSTER.

THE FOUR-CYLINDER F.N.

Sir,—The gears mentioned are standard. "Canterbury" will find the 6 to 1 gear not too low, unless he keeps the engine in top hole form. I presume his is an a.o.i.v. When building the engine up again I should advise fitting in a piece of fine gauze under the extra air inlet, and also a piece where the carburetter is joined to the induction pipe; they will assist vaporisation.

Personally, I prefer a four-cylinder machine, and must say the 1913 F.N. I recently sold gave me good service. I could do 75 to 80 m.p.g. As for speed, he will find his engine doing "some" revs. if he gets up to 35 m.p.h. The F.N., in my opinion, is not one on which record speeds can be made. I always found this class of machine very economical and as comfortable as a car.

The weakest part of the machine is the frame. I could never understand why a stronger tube was not used, and "Canterbury" will find a sidecar a severe strain on the steering head. LK 1831.

Stroud Green.

FLAT TWIN INDUCTION SYSTEMS.

Sir,—We notice in publishing the description of the new Raleigh twin opposed particular attention was drawn to the induction system.

It will no doubt interest you to learn that in 1910 we produced a 5 h.p. opposed twin engine, embodying an almost identical feature, with the exception that, in addition to part of the induction pipe cast integral with the crank case, the remainder of the pipe formed a part of the cylinder casting, there being no union nuts or flanges of any description, the ports in the cylinders registering with the pipe in the crank case when the cylinders were bolted in position.

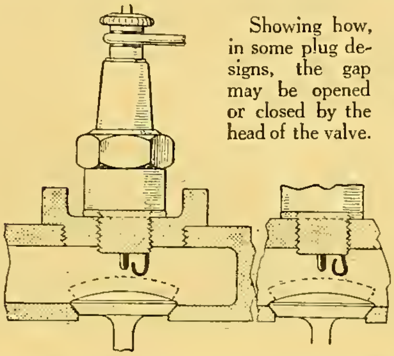
We have also at present an engine embodying this system in a modified form, and in the 1914 T.T. race we used an induction in which the carburetter lead was part and parcel of the timing case, two short pipes connecting these to the cylinders.

Another similarity between the early 5 h.p. Douglas and the Raleigh is to be found in the frame construction, both using straight duplex down tubes and other frame members.

DOUGLAS MOTORS, LTD.

FAULTY SPARKING PLUGS.

Sir,—From an article by "Road Rider," written some time ago, I see that a correspondent suffers from sparking plugs "which automatically widen their sparking gap in use." He suggests faulty plugs, but may I suggest the following as the cause? The plug projects too far into the cylinder, so that the valve immediately beneath it hits the lower electrodes and knocks them further from the central electrode, as shown in the sketch. I once had a similar trouble on an old Minerva, but with a different type of plug, so that the points automatically closed up.



Showing how, in some plug designs, the gap may be opened or closed by the head of the valve.

G. BAGSHAWE (Lt., 9th/13th Tank Corps).

R.G.A. DESPATCH RIDERS.

Sir,—There seems to be a great deal of controversy in your columns regarding D.R.'s belonging to R.E. and R.A.F., but one seldom reads anything concerning the D.R.'s of the R.G.A. In my opinion, these D.R.'s do more hard work and under far worse conditions than any other D.R.'s. The R.G.A. rider starts where the R.E. rider leaves off, and continues his work up to the firing line, and as for the R.A.F. riders they seldom come within four or five miles of the batteries. I do not wish to belittle the work of the R.E. and R.A.F. riders, but in the majority of cases they have a "cushy" job compared with the battery riders. These men have to do their own repairs and adjustments, often under very bad conditions and with poor tools. The battery rider gets a variety of jobs, driving officers to O.P.'s or as near as possible, taking despatches to Brigade H.Q.'s, collecting small gun parts from ordnance workshops, etc. He has to be ready to go anywhere at a minute's notice, day or night, wet or fine, over the worst roads, solo or sidecar.

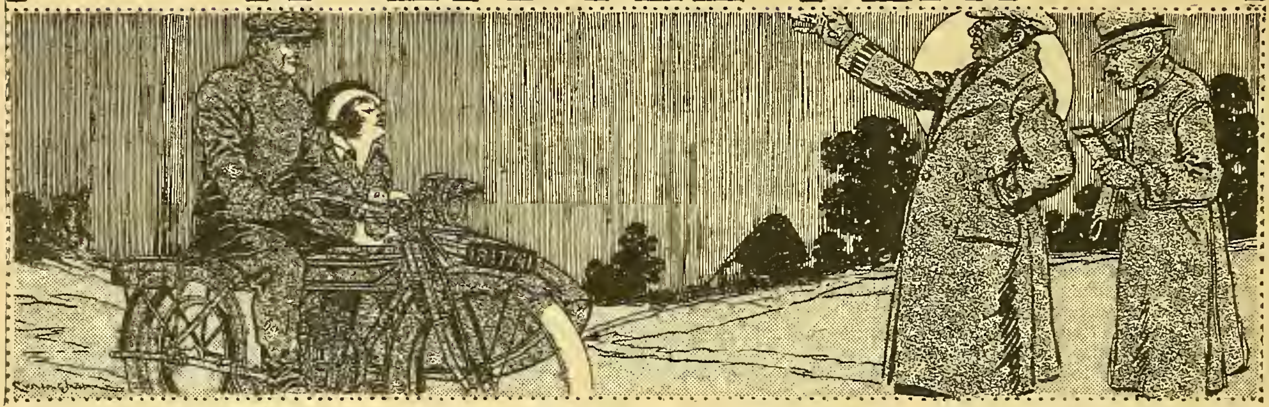
With regard to military utility of machines out here. We have three flat twin solos and one sidecar combination in our battery, and are constantly having trouble with front fork springs and spindles breaking, gear boxes working loose and causing chains to fly off, front down tubes of frame fracturing, etc. The sidecar chassis also give a lot of trouble, especially the springs and transverse rear tube, due mostly to being built too low and fouling edges of shell holes, large stones, ruts, etc. The power units on the whole are fairly good, but the kick-starter very often shirks its duties. These machines are not nearly so comfortable to ride as the single, the heavier weight and better riding position of the latter making it far easier to sit over bumpy roads. Engine vibration does not count on this work.

I may say I hold the rank of Staff-Sergeant Artificer, and in that capacity I do a good deal of riding to ordnance workshops, etc., and also do repairs to the machines if possible. My experience of motor cycles dates as far back as the days of surface carburetters and accumulator ignition, and I also have been out here in the R.G.A. since April, 1915, so I think I may claim to know what I am writing about.

I have been a regular reader of *The Motor Cycle* since its early days, and look forward eagerly to its arrival here every week. The articles it contains are just now very interesting, especially the descriptions of new ideas in engine design, transmissions, etc. At present I am busy with elimination of misfires, leaky pistons, and other mechanical misbehaviour of six females of the howitzer kind; but am looking forward to the time to come. TIFFY.

B.E.F.

A LITTLE PLAY



In one Defence-of-the-realm Act. By Bilbo.

DRAMATIS PERSONÆ:

1st Special Constable	A Knowing Bird.
2nd Special Constable	A Cure.
Motorist	A Caution.
Lady Passenger	A Oner.

SCENE: Any suburban road in any town.

TIME: 12.30 a.m. on any wet night in November, 1917.

N.B.—Although written in blank verse, nothing is to be inferred from this.

Ist and 2nd Specials discovered slowly patrolling the road with their collars turned up, trying to look useful.

1st Special (dejectedly): 'Tis weary work, this dull monotony,
From ten to two on chilly autumn nights
With nothing ever doing.

2nd Special (more dejectedly): Aye, it is,
And long before the hour of twelve has struck
You've torn the war to tatters and discussed
The many possibilities ahead
Were you but in command of our brave lads
On sea or land. That wearies me still more.

1st Special: At all events you cannot doubt my aunt
In Lancashire who knows that man—

2nd Special: I am
Fed up with all your aunts. You talk too much.

1st Special: There is naught else to do. In these hard times
It is not worth the burglar's while to steal,
And drunkards find their liquor hard to get,
Thus we have leisure.

2nd Special: True, and only those
Who talk remain at home, and we are all
Half suffocated in a flood of words
Poured out by such as you.

1st Special: Oh, very well,
If you don't like it—Ha! methinks I hear
A distant rhythmic beat betokening
The swift approach of some bold motorist
Who braves alike the weather and the Act.

2nd Special (brightening): Now may the gods reward the man who first
Remembered our lack-lustre hours of ease
And passed these regulations.

1st Special: Here he comes;
So do you flash your lamp and I will blow
A blast upon my whistle that would stop
Sir Douglas Haig himself. Then you shall see
Some sport, I warrant you. Now, watch me close,
Mark how I play him like a spinning trout,
Or even as a cat will tease a mouse.

[*Enter Motorist and Lady Passenger.*]

Halt! Halt! I say, and tell us by what right
You squander precious juice upon the road.

Motorist: Don't be alarmed, my dear; that awful sight
Which rises up before us in the murk
Is but a face—at least, I think it is.

1st Special: Now then, come off it.

Motorist: Yes! it moves; it speaks;
It is a face. I thought it was. But still
That's not his fault, poor chap.

Lady Pass.: How sad to think
Of any fellow-creature bearing such
Affliction through his life.

Motorist: Yes, yes, indeed,
Poor chap; it must be hard.

Lady Pass.: But we were taught
As children that we ought to pity those
In such a sorry state.

Motorist: I must admit
I've never met a greater tragedy,
And I have seen some sights.

1st Special: Come, none o' that,
Or you will make it harder for yourself.

Motorist: I think the voice is even worse, don't you?

Lady Pass.: It takes me back again to my old home,
Where corn-crakes got their feet wet in the dew,
And, having caught their death of cold, would come
Beneath my window half the night, and croak
With husky raucous voices.

1st Special: Look 'ee here,
Possess us of the facts that we demand,
And let me warn you that each word you speak
May be brought up as evidence in Court,
So drop this rot.

Lady Pass.: I wonder if it bites!

2nd Special: That goes down for a start to Number Two.

1st Special: The facts, I say, and failing an excuse
For this unpatriotic pleasure trip—

Motorist: Who talks of "pleasure" on a night like this?

1st Special: We'll hale you and your passenger forthwith
Before the strictest magistrate in town
To answer for your fault.

Motorist: I do believe
It is addressing us.

1st Special: Put that down sharp.

2nd Special: I've got it, man.

Motorist: Am I to understand
That all I say is being taken down
By Bolo Bert who stands with solemn frown
And licks his pencil at your side?

1st Special (grinning): You are.

Motorist: And will be read verbatim to the beak?

1st Special: You bet your life.

2nd Special: I'll read it word for word.

A Little Play.—

Motorist: Then let me tell you that your ruby nose,
Which glows like any rear light through the gloom—
Your hat, your hands, your uniform and boots,
And those anthropoid ears which catch the breeze:
That face—that lamentable face—in short,
Your whole get-up, doth like me not; so if
Your pretty little friend has got that down,
And promises to speak the speech before
The public court as I have tutored him,
That's all I ask. Life has no more to give.
And now, hence, fellow, let us on.

2nd Special (smiling largely): That's all
Down right enough.

1st Special: Then you can cut it out;
And do try not to be an owl, you owl.

2nd Special: An owl I may be, my nose is not
A tail lamp, nor my ears—

1st Special: Oh, do shut up.
Now then, me lad, this sort of thing won't do.
You't better drop it quick and let me see
Your licence and your petrol card; come on—

Motorist: Come where?

1st Special (assuming official manner): Perdooce yer licence
and—

Motorist: Say "Please."

1st Special: I want none o' your lip.

Motorist: You're not at home
In Germany, you know, just now.

2nd Special: Ho! Ho!

Lady Pass.: *I* thought it looked Teutonic, too.

2nd Special: Ha! Ha!

1st Special to 2nd do.: If you don't mind I'll break your
silly neck
In twenty diff'rent places.

2nd Special: Try it on
And see what happens.

Lady Pass.: Do!

1st Special: I will. But first
To settle your affair, my bonnie boy,
Just let me see your petrol card at once.

Motorist: I have no card.

1st Special: So much the worse for you,
For now you must explain yourself at length—
Where from? Where to? And what the business is
Which occupies you on a night like this.

Motorist: I don't see why I should. My starting point
Concerns you not. My goal is my affair.
My business is *my* business. And, what's more,
I hate all fools.

2nd Special: Ha! Ha! Mark how I play
Him like a spinning trout or as a cat
Will tease a mouse.

1st Special: That's done it. Now you come
Alonger me.

Motorist: What for?

1st Special: The law demands.

Motorist: I said I hated fools. Well, so I do,
And if you were not quite so plaguey smart
You'd see this cylinder of gas—

2nd Special: Ha! Ha!
I've got that down. It makes a decent line—
"When Gas meets Gas," or "Gas bags both." Ho! Ho!

1st Special: That puts the lid on.

2nd Special (reading his notes): "Anthropoid—"

1st Special: All right
My Bolo Bertie—

2nd Special: You say that again—

1st Special: Who licks his pencil, wasn't it?

2nd Special: Aye, aye,
And more he licks if need arise.

1st Special: Such as?

2nd Special: A nose which glows—a face—

1st Special: Now will I give
You something for yourself.

2nd Special: Again I say,
You try it on.

Lady Pass.: Yes, do!
(He does. In fact, they give one another a good deal. And under cover of this largesse the motorist drives on, calling out, "Chin-chin.")

1st Special: "Now will I give
You something for yourself."
2nd Special: "Again I say,
You try it on."
Lady Pass.: "Yes, do!"

* * *

THE ETERNAL QUESTION.

We have already referred to the rumour emanating from some unknown source, and once having quite a vogue, that petrol was to be released for unrestricted use during some period in July or August. The rumour is false.

Even if petrol were available, it is very improbable that its use would be legalised, for there are several indications that political questions have a certain bearing on the decision of the Petrol Control Department. The total abolition of private motoring was undoubtedly largely due to the Government's impression that the continued support of a section of the Labour Party was dependent upon the suppression of what is known as "joy-riding."

These sentiments, unreasonable and unpleasant as they may seem, have accounted for a considerable portion of our trouble. It is, perhaps, worth while to emphasise this aspect of the case to such bodies as those existing primarily for the securing of preferential treatment in petrol matters to certain sections of the community. Those people regarded, rightly or wrongly, by the Labour Party as their natural enemies were, in the obvious nature of things, able to use their motors after many motorists had given them up. Continued protests could only have one result, that under which we are now suffering—the total prohibition of motoring. And now those very agitators who caused the prohibition are loudest in their protests against it.

QUESTIONS & REPLIES

A selection of questions of general interest received from readers and our replies thereto. All questions should be addressed to the Editor, "The Motor Cycle," 20, Tudor Street, London, E.C.4, and whether intended for publication or not **must be accompanied by a stamped addressed envelope for reply.** Correspondents are urged to write clearly and on one side of the paper only, numbering each query separately, and keeping a copy for ease of reference. Letters containing legal questions should be marked "Legal" in the left-hand corner of envelope, and should be kept distinct from questions bearing on technical subjects.

Carburetter Adjustment.

? I should be glad if you would enlighten me on the following subjects. I am the possessor of a 2½ h.p. New Imperial-Jap, fitted with a B. and B. single-jet carburetter: (1.) What is the bore, stroke, and c.c. of this engine? (2.) With the air lever fully open and throttle two-thirds open the best results are obtained. If the throttle is opened further it decreases the speed if anything. I considered fitting a larger choke tube, but the makers inform me that it is part and parcel of the carburetter and is not to be removed. (3.) I am using a 31 jet, which is rather large. Would a smaller jet improve things, and what size would you recommend?—J.B.S.

(1.) The dimensions of the engine are 70 mm. × 76 mm. = 293 c.c. (2.) Perhaps with a smaller jet you will be able to open the throttle fully. (3.) Probably the next size smaller. It is best to experiment.

Dismounting a Clutch.

? I have a 1914 3½ h.p. Premier fitted with a hub clutch. I wish to overhaul the clutch, and would be glad if you would tell me the way to take it to pieces. I have taken the wheel out of the machine and the cone and balls out, and have removed the belt rim, but cannot get the free-wheel off nor the end plates of the cone box (the hub cups). I have unscrewed the one on the free-wheel side about twelve threads, but it will not come out any more, although it will turn round. (1.) Does it need the pressure on the clutch springs releasing before unscrewing any more? A few hints on the dismantling and assembling of the clutch would be greatly appreciated. (2.) Does the Fit-All engine-shaft gear, made by Lake and Elliot, contain an adjustable pulley the same as an N.S.U.? (3.) Also what per cent. of decrease has the Fit-All from top to second gear? (4.) What is Messrs. Lake and Elliot's address? (5.) Is a Roc hub gear fitted with a free engine clutch?—J.G.

(1.) The left-hand hub disc is a left-hand thread. This should be taken off, and then the spring should be compressed and the locking ring removed, which should enable you to withdraw the section of the hub to which the free wheel is attached. In this case the Premier booklet should be of assistance to you. (2.) The Fit-All gear does not incorporate an adjustable pulley. (3.) Fifty per cent. reduction. (4.) Messrs. Lake and Elliot, Ltd., Albion Works, Braintree, Essex. (5.) Yes.

Running Costs.

? What do you consider is the cost per mile of running a motor bicycle just now, taking in tyre and other replacements, petrol, licences, etc.? The bicycle referred to is a 1914 Triumph, has been in use for four years, and the runs are mostly short.—J.D.

Your question does not allow of a definite answer, as everything depends upon the way in which the machine is treated and also upon the mileage run. We should say, however, that 1½d. per mile would leave a margin.

Two-stroke Timing and Lubrication.

? I have purchased a second-hand 1913 Scott, and have experienced the following troubles: (1.) The engine will not fire regularly, pops periodically in the exhaust pipe, and stops. I have timed the magneto thus: Spark fully advanced, piston ¼in. off top dead centre on the compression stroke. Is this correct? When running under load, the engine refuses to pull, if I retard the spark much. (2.) I cannot get any power out of the engine at all, unless I keep the carburetter needle raised so as to cause flooding. Why is this? (3.) I have experienced trouble with the driving chain to the back wheel. I took the machine to a garage, and was informed that it makes no difference with so long a drive whether the two sprockets are in absolute alignment or not; the only reason for the chain riding on the teeth was due to its having stretched. Is this the sole cause of its coming off?—R.B.W.

(1 and 2.) The trouble is caused either by a weak mixture or faulty timing of the magneto. The piston should be on dead centre and the points just fully broken when the spark lever is fully retarded. The popping in the exhaust pipe is probably caused by a weak mixture, accentuated somewhat by the late timing. You should first of all, therefore, time the magneto correctly and note the result. The reason that you cannot obtain any power from the engine unless the float needle is raised and jet flooded may be due to the fuel level in the float chamber being too low or the jet being too small. We presume you have made certain that there is no obstruction in the flow of fuel from tank to float chamber and float chamber to jet. (3.) The advice given to you at the garage is quite incorrect, as in all chain drives it is essential that the sprockets are perfectly aligned. The fact that the chain rides on the teeth is probably due to the sprockets affected being considerably worn. The cause of its coming off is partly due to the wheels being out of line, and partly to a stretched chain.

IMPORTANT NOTICE.

GOODS MADE IN GERMANY.

The proprietors of this journal, being fully in accord with the recommendations agreed upon at the Paris Economic Conference, give notice that they will not permit the advertisements of new goods manufactured in enemy countries to appear in this publication, either during or after the war.

ILIFFE & SONS LTD.

READER'S REPLY.

Faulty Flywheel Key.

The query on page 576 of the issue of June 13th is rather an interesting one. There may not have been anything the matter with the material of the key, or surely it would have gone wrong between 1914 and 1918. I should feel more inclined to think "A.G." had upset the timing and put an extra strain on the key, which probably did not split in half, but sheared. It looks as if, in addition to tougher material, it wanted to be of stronger section. Some flywheels are fitted without a key at all, being merely jammed tightly on the taper.—V.A.H.

RECOMMENDED ROUTES.

LEICESTER TO SAFFRON WALDEN.—J.T.

Leicester, Market Harborough, Kettering, Thrapston, Huntingdon, Godmanchester, Cambridge, Chesterford, Saffron Walden. Distance approximately 85 miles.

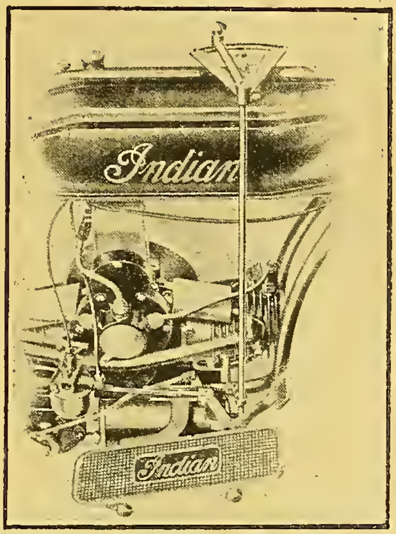
HALTWHISTLE TO BURTON-ON-TRENT.—E.D.

The best road is through Hexham to Newcastle, and then the Great North Road *viâ* Chester-le-Street, Neville's Cross, Ferryhill, Darlington, Scotch Corner, Boroughbridge, Aberford, Ferrybridge, to Doncaster; here to the right, and through Worksop, Mansfield, and Derby to Burton. If you do not mind rough roads and hills, a more interesting route will be: Haltwhistle, Knaresdale, Alston, Ashrigg, Middleton-in-Teesdale, Barnard Castle, Scotch Corner, and then on as above.

A FEATURE OF THE

1918 Indian LIGHT TWIN.

THE POWER PLANT
AND
GEAR CONTROL.



We regret that we are not in a position to supply motorcycles at the present time. But we can send 1918 descriptive list on application.

This applies to Great Britain only.

HENDEE MANUFACTURING CO.,
"Indian House," 366-368, Euston Road,
London, N.W.
Telephone: Museum 1643.
Telegrams: "Hendian, Eusroad, London."
AUSTRALIA—109-113, Russell St., Melbourne.
AFRICA—Indian House, 127-9, Commissioner St., Johannesburg; Indian House, 579, West St., Durban; Indian House, Strand St., Port Elizabeth.

How many Miles per Cover?

A TYRE is worth the mileage it gives you—not what you pay for it. If you would know the value of a tyre (how it wears, if it is easily punctured or cut) you must ask a user of that Tyre—Many users of Beldam All British Tyres have recorded their experiences in a little Booklet entitled "Testimony," which will be sent post free on request. It will help to make clear to you why "once used always used" applies to Beldam Tyres, and that Quality, which means good service, always counts. It is because of the high quality of design, material, and workmanship that Beldam Tyres wear so long, and give such satisfaction.

Retreads

INVEST in a Beldam Retread: it costs shillings—it saves pounds. Read this testimony:

"I have done over 5,000 miles on the last retread you did for me about twelve months ago. I think it is money well spent in Beldam Retreads."
—A. G. W.

Send old covers of any make and we will quote you cost of retread.

Write for Complete List of Prices.
The Beldam Tyre Co., Ltd.
Brentford - - Middlesex.

Manchester: W. Briggs & Co., Bazaar Street, Pendleton. Nottingham: The City Rubber Co., 106, Upper Parliament Street. Ireland: P. Drohan & Sons, Castle Street, Carrick-on-Suir; The Simms-Boyd Co., 7, College Street, Belfast; Vickery's Bantry Motor Garage Co., Bantry. Egypt: Valsamidis & Valsamis, 3, Rue Stamboul, Alexandria. New Zealand: J. E. Fitzgerald, 139, Lambton Quay, Wellington.

BELDAM
All British Tyres

Godbolds

MISCELLANEOUS ADVERTISEMENTS.

PRICES.

ADVERTISEMENTS in these columns —First 12 words or less 1/6, and 3d. for every two words after. Each paragraph is charged separately. Name and address must be counted. Series discounts, conditions, and special terms to regular trade advertisers will be quoted on application.

Postal Orders sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co.

All advertisements in this section should be accompanied with remittance, and be addressed to the offices of "The Motor Cycle," Hertford Street, Coventry. To ensure insertion letters should be posted in time to reach the offices of "The Motor Cycle," Coventry, or London (20, Tudor St., E.C.4), by the first post on Friday morning previous to the day of issue.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement, and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of advertisers, letters may be addressed to numbers at "The Motor Cycle" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge. Only the number will appear in the advertisement. All replies should be addressed "No. 000, c/o 'The Motor Cycle,' 20, Tudor Street, E.C.4."

☛ DEPOSIT SYSTEM.

Persons who hesitate to send money to unknown persons may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Motor Cycle," both parties are advised of this receipt.

The time allowed for a decision after receipt of the goods is three days, and if a sale is effected we remit the amount to the seller, but if not we return the amount to the depositor, and each party to the transaction pays carriage one way. For all transactions exceeding £10 in value, a deposit fee of 2s. 6d. is charged; when under £10 the fee is 1s. All deposit matters are dealt with at Coventry, and cheques and money orders should be made payable to Iliffe & Sons Limited.

The letter "D" at the end of an advertisement is an indication that the advertiser is willing to avail himself of the Deposit System. Other advertisers may be equally desirous, but have not advised us to that effect.

SPECIAL NOTE.

Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post.

MOTOR CYCLES FOR SALE.

Abingdon.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Abingdon-King Dick, 1914, 4h.p., T.T., fast; 25 gns. [6268

A.J.S.

CROW Bros., Guildford, A.J.S. agents since 1912, always have dependable second-hand machines. [5369

A.J.S. 1916 4h.p. Twin, 3 speeds, sloping frame, kick start, all accessories, guaranteed; £67.—Maudes', below.

A.J.S., 1915, 2¾h.p., 2 speeds, sloping frame, kick start and clutch, fully guaranteed; £46.—Maudes', 100, Gt. Portland St., London, W.1. [6301

A.J.S. 1916 6h.p. Combination, Lucas dynamo and lamps, spring seat, spare wheel, very smart; £97/10.—Farrar.

A.J.S. 1915 6h.p. Combination, spare wheel, Lucas lamps, Cowey speedometer, extra smart; £87/10.—Farrar.

A.J.S. 6h.p. Combinations.—We have five in stock. If you wish to buy, sell, or exchange your A.J.S., write us.—Farrar's Motors, Hopwood Lane, Halifax. [6124

A.J.S., 1916, 2¾h.p., 3-speed, hand clutch, kick start, new Dunlop back, just overhauled, not ridden for 9 months, equal new, in splendid running order; £39/10.—413, Walton Breck Rd., Liverpool. (Privately owned) [X5614

GODFREY'S

'I come from New Zealand, where SQUARE DEALS and Godfrey's mean the same thing."
(From an old Testimonial.)

"I am writing to you because I have heard you are RELIABLE in every way."
(Extract from a recent Letter.)

GODFREY'S have a WORLD-WIDE reputation for RELIABILITY, because the machines they sell are RELIABLE.

They are reliable, because each and every machine is dismantled and thoroughly overhauled before re-sale.

GODFREY'S have a large stock of New and Second-hand Solo and Sidecar Outfits equal to the most exacting work.

Why not write for full Lists to-day?
EXCHANGES. Gradual Payments accepted.

GODFREY'S, Ltd.,
208, Gt. Portland St,
LONDON, W.1.
'Phone—7091 Mayfair (2 lines).
WE OPEN AT 8 O'CLOCK A.M.

Repairs for Spares

DIXIE

or Splitdorf magnetos go to the MANUFACTURERS'

Representatives. They know what is required. They have the most extensive stock of spares. Address:—

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CLEAN ALUMINIUM, BRASS, and GUNMETAL
CASTINGS
For AIRCRAFT, MOTORS, and MOTOR CYCLES

SAMUEL F. ROGERS
(Metallurgical Chemists & Metalographists),
CALEDONIAN WORKS, PRINCE'S END, TIPTON.

MOTOR CYCLES FOR SALE.

A.J.S.

4h.p. A.J.S. Motor Cycle and Sidecar, new, unused, interchangeable wheels; 100 gns.—S. L. Taylor, Town Quay, Falmouth. [6163

A.J.S.—Immediate delivery of Military Model, 700×80 tyres, detachable wheels; £91/6.—Exeter Motor Cycle Co., Ltd., Bath Rd., Exeter. [3520

DELIVERY from stock of Military Model A.J.S., 700×80 tyres, detachable wheels; £91/6.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0551

A.J.S. Motor Cycles.—Immediate delivery of Military model, complete, detachable wheels, 700×80 tyres; £91/6; no permits required.—P. J. Evans, sole agent for Birmingham and district, 87-91, John Bright St., Birmingham. [5675

A.J.S. Spares; prompt delivery.—Cyril Williams, Chapel Ash Depot, Wolverhampton. [4987

Alldays.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Allon, 1918, spring frame, 2-speed, clutch, kick start, as new, 45 gns.; Allon, 1916, 2-speed, perfect, 29 gns. [6255

LATE Model 2¾h.p. 2-stroke Allon de Luxe, 2 speeds, hand clutch, kick starter, spring frame, fully equipped, good order and condition; 35 gns.—Box L6,501, c/o *The Motor Cycle.* [6286

ALLON, 2¾h.p., 2-speed, 2-stroke, lamps, spares, leg shields, new belt, 122 m.p.g., beautiful condition, also sidecar, couplings, etc.; £28; good cycle part payment.—Tindall, 45, Lockwood Rd., Ilford. [6140

Ariel.

CROW Bros., Guildford, Ariel agents.—New and overhauled second-hand models in stock. [5370

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Ariel, 1913-14, 3½h.p., 3-speed, just completely re-enamelled and replated; 32 gns. [6250

1915½ Ariel Motor Cycle Combination, 3-speed countershaft, kick starter, mileage 2,000, condition as new; £65; take solo part payment, or separate.—Crichton, 295, Edge Lane, Droylsden, Manchester. [6203

A.S.L.

A.S.L., 3½h.p. J.A.P., Grado gear, Bosch mag.; £14/10.—Motor Exchange, Horton St., Halifax. [6175

Auto-Wheels.

AUTO MOTOR, 3½h.p., Bosch mag., good tyres; £7/10.—Motor Exchange, 68, Horton St., Halifax. [6174

AUTO-WHEEL (5952), latest improvements, shock absorber, in good going order; £6/10.—Evans, Lanner, Redruth. [X5594

Bat.

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Bat-Jap, 1914, 5-6h.p., 3-speed; 34 gns. [6251

Bradbury.

BRADBURY, 4h.p., and sidecar, 2-speed, handle start, good order; £25; after 7.—469, Kingston Rd., Wimbledon. [6224

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—Bradbury, 1914, 4h.p., 3-speed combination; 35 gns. [6258

BRADBURY, 1914, 6h.p., and sidecar, £55; 1912-1913 3½h.p., 3 speeds, with coach sidecar, £32/10; 1913 3½h.p., 3-speed model, £29/10.—Motor Exchange, Horton St., Halifax. [6176

Brough.

1917 3½h.p. Brough, Model H., 3-speed, kick starter, h.b. clutch, new condition throughout; £55, or offer, or exchange T.T. Norton, Triumph.—Box L6,504, c/o *The Motor Cycle.* [6322

BROUGH, 1915, 3½h.p. flat twin, 2-speed countershaft, engine just overhauled, good tyres, new Dunlop belt, lamps, and generator, Spartan horn; cost £42 two months ago, accept £38, or near offer.—Simpson, 2, Seagry Rd., Wanstead. [6141

Brown.

BROWN Combination, 4h.p., engine No. 82/1574, Jardine 4 speeds, Bosch, type ZA1, B. and B. carburetter; £30, bargain.—Rendle, 153, Stanstead Rd., Forest Hill. [6244

B.S.A.

B.S.A., 1913, 3½h.p., speeds; £25.—47, Streatham Hill, S.W. [6211

B.S.A., late 1916, 4¼h.p., chain-cum-belt, excellent condition; £50, or near offer.—D. W. Searle, Burnham Market, Norfolk. [X5490

RIDER TROWARD and Co., 31 and 40b, High St., Hampstead.—B.S.A., 1913, 3½h.p., 2-speed, clutch, pedal start; 24 gns. [6256

1916 B.S.A. and Millford sidecar, 4¼h.p., chain-cum-belt, lamps, horn; bargain, £55.—Elce and Co., 15-16, Bishopsgate Av., Camomile St., E.C.3. [0552

B.S.A., late 1915, 4¼h.p., 3-speed, chain-cum-belt, very little ridden, new tyres; £45.—Colonel Brittain, 35, Rusholme Rd., Putney. [6208

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